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CONTENTS.

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XXVI.

THE FISHES.

BY S. GARMAN.

ONE VOLUME TEXT,
WITH NINETY-SEVEN PLATES,
AND A CHART OF THE ROUTE.

TEXT.

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DEC 28 1899

DEEP SEA FISHES.

GENERAL DISCUSSION.

The collection upon which this report is based was made during February, March, and April, 1891, by the steamer "Albatross" of the United States Fish Commission in that part of the Pacific Ocean lying east of the Galapagos Archipelago, and of a line from it to the peninsula of Lower California. The area traversed is bounded on the east by the coasts of Mexico and of Central America; it is long and narrow, but by extending obliquely across the meridians and the parallels it reaches through thirty-five degrees of longitude and twenty-nine degrees of latitude, from 77° to 112° west longitude and from 1° south latitude to 28° north. The section is small in comparison with the entire extent of the Pacific, yet the importance of the material collected is greatly enhanced by the position of the locality, by the fact that much the larger portion of the dredging and trawling was done close to the equator, in the Gulf of Panama and immediately to the westward. More than twelve hundred specimens of fishes were secured; many of these were shoal water forms, nearly all of which belonged to species described by Jenyns, Günther, Steindachner, Jordan, Gilbert and others, and having only an indirect present interest. About nine hundred of the specimens belong to the greater depths; they represent thirty-three families, a hundred genera, or about a hundred and eighty species hardly more than fifteen per cent of which have been heretofore described. The depths at which the bathybial fishes were taken range from a hundred fathoms downward; the greatest depth, 2232 fathoms, occurred west of Costa Rica on a line from Culpepper Island to Acapulco, Mexico, and the nearest approaches to this were found off the Gulf of Panama about midway to the Galapagos in 1823 and 1877 fathoms.

Previous to the year 1891 almost no deep sea collecting had been attempted in the equatorial regions. On other cruises the "Albatross" had searched the depths off the western coasts of North America from the Gulf of California to Bering Sea. The same vessel and other vessels of the Coast Survey and of the Fish Commission of the United States had obtained a fair knowledge of conditions in the northwestern Atlantic from the Caribbean Sea northward, to which the British steamer "Challenger" also contributed something; the "Challenger" the "Travailleur," the "Talisman," and other vessels of various European governments rendered a like service in the northeastern Atlantic from the Cape Verdes and the Mediterranean northward; the "Challenger" researches added much to ichthyological knowledge of the northwestern Pacific and the Australian regions, also a little concerning the southwestern Atlantic and the Antarctic; and the British Indian steamer "Investigator" has done a great deal of work in the northern reaches of the Indian Ocean. The most of these researches were effected far to the north of the equator and a comparatively small amount was accomplished in southern latitudes. The present collection of the "Albatross" supplies data from the waters under the equator and in a measure provides the means of connecting the results obtained in the north with those from the south, which latter, however, pertain almost entirely to the shoal water fauna of that region.

Genera of animals known toward the Arctic regions having been found to occur in the Antarctic, to some extent the fact that they had not been carefully sought in the equatorial waters was overlooked, and a theory of a bipolar distribution with absence from the torrid zone was accorded a considerable amount of favor. Acceptance of this theory was not at all general, for as early as 1880 Günther had published his belief that separate horizontal regions could not be distinguished in connection with the fishes of the abyssal fauna, yet it was not until 1891, in the present collection, that abundance of material proof that the belief was well founded was secured, — proof that the bipolar theory could not apply to the bathybial fishes. So many of the least expected families appear in the collection that there are doubts of the absence from the localities from which it was gathered of any of the fishes of the deep sea. The presence of Raiæ, Pediculates, Discoboles, Gadoids and Myxinidæ, among others, leads one to anticipate the occurrence in the same areas of any of the known fishes of great depths. If the collection is compared with collections made in distant localities it is seen that a certain degree of sameness runs through all of them. There is similarity in all of the higher groups and, a few new ones aside, the genera are either the same or very closely allied; it is only on reaching the species that distinctness is found to be the rule. The bathybial fauna of one locality corresponds as closely with that of each other as it might if one list had been made for all, with allowance for occasional exceptions and for differences among the minor divisions, that is in the species and the varieties. In comparisons of allied species from different and distant localities, it is among the forms for which nature has made the weakest provision in the way of locomotive organs that the divergences are greatest; those species of a genus that are fixed to particular places by reason of inability to travel distances of considerable length are most distinct, while those more able to migrate are less divergent in their specific characters. Migrations, possibly aided by the currents of the depths, widening the areas of distribution of particular abyssal species no doubt occur, but in most cases they are limited in extent or the migrations proceed slowly through long periods of time, since the individuals taken in localities perhaps only a few degrees apart show marked differences as compared with others of the same species and the occurrence of identical species in localities separated by wide stretches of the ocean is really exceptional. Many so-called identical species from widely separated localities, as from the Atlantic and the Pacific, have been recognized by conservative authorities, but subsequent comparative studies have led to such different conclusions and subdivided so many of the species that doubts are raised as to absolute identity in any species said to occur in localities very distant from one another. The idea that the same species might exist in an abyssal depth under the equator and near the Arctic or the Antarctic circle, the tellurian conditions being supposed to be the same in the different localities, is not to be accepted unless applied to particular migrants and limited in time. The existence of separated localities in which all the conditions are identical is only supposable, not probable, and even if they might exist, which is not to be admitted, the same conditions affecting different individuals (varieties or species) differently induce, directly through impress and indirectly through the effort occasioned by it, different divergent tendencies in variation which preclude the existence of the same variety or species for any considerable length of time in localities far from one another without repeated migrations from one to the other. The possibilities of exact coincidence in the lines of variation of the same species in two localities or of convergent lines bringing different species to coincide are too remote to be considered. In the case of an identical species discovered in widely separated localities it is safest to consider it to be in the line of its migrations, either upon its travels or a comparatively recent migrant at the time of its capture. An assertion of the existence of a non-migratory species in localities isolated by distance or physical barriers is not to be received without serious question.

Given similarity in isolation, differences in degrees of plasticity not being taken into consideration, specific differentiation would probably be less active or less rapid in the low temperatures of the depths than among fishes near the surface, and in consequence it might be expected that conditions on the sea bottom would favor the existence of persistent types, that is of some of the fossil forms commonly designated as extinct types. That no such forms have yet been discovered among the deep sea fishes is in all probability due to the fact that the fossil forms were not themselves deep sea fishes. Excessive amounts of lime in bones or armatures and great firmness and strength in skeletal structure characteristic of the fossils do not obtain in bathybial species of the present, and there are no reasons to suppose the earlier inhabitants of the abysses differed from them in these respects. Though the extinct forms may not have been of the depths it may be that, owing to retardation in the rates of differentiation by deep sea conditions, there is a likelihood that relatives exist in the abysses in possession of closer affinities than nearer the surface, such kindred being offshoots from the stem that produced the extinct forms rather than direct descendants of the latter.

The decrease in the amount of heat, of light, and of oxygen, and the increase in the pressure encountered by the fishes on their way down to the great depths tend to reduce the activity and to prolong the lives of the individuals. From such conditions it is to be expected that as they descend beyond the influence of the sun and the seasons the deep sea fishes do not mature their eggs or develop their young so rapidly as their ancestors of the shoals or the surface were accustomed to do, that the periods intervening between the spawning times are lengthened and that the species gradually depart from the yearly recurrent extrusion period and become affected by longer and longer intervals, the length of these last being dependent on the duration of the exposure of the species to the lower temperature and minor factors. In this more or less lengthened increase of time required for development of eggs or growth of young appears an effective agent in isolation and in differentiation of the isolated species. What the effect of the retardation may be in regard to a tendency to ovoviviparity is problematical.

Some of the deep sea fishes evidently, as suggested by Agassiz, have been vertically derived from pelagic Berycoids, Scopeloids, etc.; others, as is shown with tolerable conclusiveness in the collection before us, are descendants of forms living on the bottom in shoal waters, forms that have gradually traversed the slopes from the shores to the abysses. The larval fishes secured by the tow-net at intermediate depths are mostly young of pelagic species and young deep sea Scopeloids and others descended from a pelagic ancestry.

Reasons for concluding that many of the less powerful swimmers among the bottom fishes have worked their way down, slid down as might be said, are seen on comparison of shoal and deep water forms in such cases as those of the Oncocephali (*Malthe*, Cuv.) and the Halieutoids, of the Lophioids and the deep sea Pediculates like Ceratias and allies, of the Liparids of the shoals and the deep sea Discoboles, and of the shoal water Pleuronectoids and their abyssal relatives. Similar evidence is seen in the Raiidæ, the Zoarcidæ, the Murænidæ, the Myxinidæ, and others.

It was expected that by means of the tow-net near the surface and at various distances below it, something might be learned concerning the young of species frequenting the great depths. Such expectations have not been realized. Numerous young fishes were obtained in the net, but they are identified with pelagic Berycoids, Scopeloids, and others of the intermediate upper waters, and in greater part with the shoal water fishes, Sebastoids, Percoids, Pomacentroids, Scomberesocoids, Squamipinnes, Plectognaths, Pleuronectoids, Murænoids, etc., and together they give no light on the breeding habits of bathybial species. This experience is similar to that of the "Challenger," which also by towing secured a fine lot of specimens of pelagic species, but among them few or none of those of the bottom. Among the deep sea specimens at hand there are small ones, more often apparently taken in depths somewhat less than those given for the large individuals of the same species. In these depths the temperatures were commonly somewhat higher, which is suggestive of a possible but comparatively short vertical migration in the breeding season, by which deep sea fishes secure a slightly greater degree of warmth for their young. These fishes no doubt, like their shoal water allies, make journeys in the spawning seasons, to give their progeny a warmer temperature or to place the fry in feeding grounds especially suited to it. With the immense vertical ranges of many of the species in mind, pressure is not to be considered a factor of moment in vertical distribution; temperature is a great deal more effectual.

The nearness of its locality to the isthmus of Panama is an important element in an estimate of the value of this collection, because of the bearing upon the question of a sometime passage between the Caribbean and the Pacific. In regard to this, however, the testimony of the material is not very definite, for there is much less evidence of a connection across the isthmus among deep sea fishes than among those of the shoals. In fact the abyssal forms that favor the existence of such a thoroughfare are those like Centroscyllium, Antimora and others, which swim freely and are not confined to the bottom, but are distributed around the continent to both southward and northward; while those which may be cited as against the idea, or, rather, as disproving the existence of a crossing in times at all recent, are everywhere present in such groups as the Raiæ, the Discoboles, the Pediculates, the Zoarcoids, the Brotuloids, the Myxinoids, etc., etc., of the less migratory. The weight of the evidence goes to substantiate the theory of a gradual upheaval of the isthmus, permitting a connection in the shoals to a much more recent date than in the depths, which would allow the fishes of the shoal waters readily to pass across while presenting a barrier to those of the deep sea. If the relative measurements of barriers and abysses remained the same as at present, and the isthmus underwent a subsidence sufficient to admit of the passage of the shoal water species without going low enough to affect the species of the depths, conditions similar to those indicated by the evidence of the collection would again prevail. Perhaps even a tidal wave of extraordinary dimensions might accomplish in a very short time a large proportion of that for which we have to account. As noted below there are in the material at hand surface species, such, for instance, as *Oncocephalus porrectus*, a close ally of *O. vespertilio* and others from the Caribbean, evidently of recent derivation from ancestors common to both the Pacific and the Atlantic species. The testimony of these and similar forms is to the effect that in comparatively recent times, yet so long ago as to permit of great differentiation from identical species on the two sides, there was a strait of moderate depth across the isthmus that favored the passage from the Caribbean to the Pacific, with the current, of species living near the surface. This conclusion is reached from the collection, and independently of nearly a hundred species asserted with more or less confidence by various authors to be identical in Pacific and Atlantic. Subsequent examination of these so-called identical species shows that many of them are yet to be compared and accurately determined, and that those which probably are identical are pelagic and errant types, at home in all the oceans.

The portion of the Pacific to which this report is confined lies within that designated by Agassiz as the Panamic region. Lying between the equator and the tropic of Cancer it receives the greatest amount of sunlight and heat. It is traversed by the Mexican coast current; it includes the eastern extremities of the north equatorial and the north equatorial counter currents, and also the northern extremity or efflux of the great Peruvian current. The meeting place of all these currents, over a diversified bottom, these waters swarm with living organisms and form an ideal locality for the ichthyologist.

The variations in the kind of bottom are considerable. At seven stations deeper than 100 fathoms, down to 1132, the bed is marked "rocky;" ten others, down to 782 fathoms, are "sandy;" "hard" bottom (Rhabdamina) occurred at several stations with depths ranging from 385 to 918 fathoms; at numerous points, with depths from 238 fathoms to 1879, "Globigerina Ooze" was found; for four locations, in depths of 1471 to 1823 fathoms, "Green Ooze" was recorded; and "Green Mud" formed the bottom at many places in depths of 85 to 2232 fathoms. Below a thousand fathoms of depth the ooze and mud prevail, and rocky and sandy bottoms are exceptional.

The sunlight, striking the surface more directly, penetrates deeper in the "Panamic region" than in higher latitudes where it meets the water more obliquely. Judging from the fishes, the light must reach depths of nearly or quite 200 fathoms. Below these, at the bottom, in the greater depths, there is another light, the so-called phosphorescent, due in part to the organic life and probably in part to chemical action and reaction, which latter may aid the low temperature and the enormous pressure in retarding the decay and destruction of organic tissues, whether living or dead, and which possibly to some extent may do away with the necessity of so much oxygen, even if it does not make an addition to the supply needed for the support of life. In fresh condition the fishes and other animals secured at great depths, are tinted with pale greenish to pale yellowish green, or, somewhat rarely, to pale bluish. On Plates A to N of the illustrations herewith, the colors were taken by Mr. Westergren and Professor Agassiz from the fresh specimen, before it was placed in alcohol. The pale greenish tint is seen to affect even such as become intense black when placed in the preserving liquids, Plates B and D, and Plate F, figures 1 and 3. That the abyssal light is of a pale greenish color is evident from the colors of the animals living within it; this proof is not at all confined to the coloration of the fishes, it obtains throughout the bathybial fauna. The harmony of colors between the creatures of the depths and their surroundings is paralleled by that obtaining between the ashy gray inhabitants of the desert and the arid wastes in which they live, or between the white in pelage and plumage in the Arctic fauna and in its snowy environment. From the general coloration of the animals of a particular region the zoologist may determine the character of the light by which it has been modified. Deep sea investigation has established the fact that life is pretty generally distributed on the ocean bed. From this it would appear that similarly bathybial light obtains nearly everywhere in the abysses. Probably the light of different localities varies in intensity since undoubtedly there are sections of the bottom that are more thinly clad with sedimentary deposits of organic origin, and consequently lacking in amount and activity of chemical interchange, or for other and various reasons not as well adapted for the existence of animal life.

The general greenish tint in the coloration is assimilative and occultative, as it renders the bearer like his surroundings and as it hides or conceals him. It is protective to the prey when it conceals the latter and destructive to it when the enemy is rendered invisible. As all the deep sea animals are predaceous the tint is helpful to the individual as it hides the latter from the enemy or the prey, and harmful as it increases the difficulty in discovering and securing the food. The story concerning the light at the bottom of the ocean is the same from whatever class of animals it is drawn. On the green mud and ooze the light is greenish.

The lower belt of light, like that at the surface, is inhabited by multitudes of species, represented by myriads of individuals. Between the two belts, the upper and the lower, there apparently is a belt of darkness, the Azoic belt of

Agassiz, which, with perhaps the exception of a limited space at the lower edge of the upper and another at the upper edge of the lower belts of light serving as retreats and hiding-places, is comparatively uninhabited and deserted, except as crossed to and fro by bathybial species of vertical derivation, from a pelagic ancestry, Scopeloid or other, many of them provided with lanterns, flash lights, or other luminous organs to prevent mates or individuals of a school from losing one another, or with light organs to lure the prey. The size and development of the visual organs and the rarity of blind forms among deep sea fishes are further evidences in favor of the existence of a bathybial light.

As the surface waters of the Panamic area are warmer than those of higher latitudes so the waters of the bottom in the tropics are higher in temperature than those to the north or to the southward. From the surface downward the temperature lowers with tolerable regularity as the depth increases. Approximately the warmth at 100 fathoms is 56° Fahrenheit, that at 300 fathoms is 46°, that at 500 fathoms is 41°, that at 1000 fathoms is 37°, and that at 1800 fathoms is 36°. The lowest temperature for the collection, 35.8°F., was noted at 1772 and at 2232 fathoms; 36° was found at depths of 1322 to 1879 fathoms; 36.2° to 36.8° were recorded for depths of 1020 to 1823 fathoms; and 37° was taken at various depths from 919 to 1588 fathoms. At the same depth in different stations the temperatures are higher or lower, conditions that would cause bathybial currents and which must be regarded as proof of their existence. No doubt there is an annual rise and fall of temperature at the bottom, however deep, but that it is sufficient to hold the fishes to the annual spawning periods of their ancestors in the long continued presence of the retarding effects of very low temperatures is somewhat doubtful. Farther from the tropics the annual variation of temperature at the bottom is much greater, but in those localities the greater retardation effected by still lower temperatures must also be considered. Fishes abound in the lowest temperatures taken in the Panamic region; no less than thirty genera were found in temperatures of 36° F. or lower. The lowest temperatures that can be endured by fishes is not yet definitely determined, but there is no doubt of their ability to exist in those of less than 32° F. The Norwegian steamer "Vöringen" secured specimens of *Myctophum Mülleri* Gmel. in lat. 71° 59′ N., long. 11° 40′ W., at a depth of 1110 fathoms in a temperature of 29.7° F.; the English steamer "Research" reported the same species from the Faröe Channel at depths of 300 to 465 fathoms, in temperatures of 31° to 33°, and at the surface, the temperature of which was 54° F. In the northwestern Atlantic this Scopeloid is said to have been taken by the "Blake," the "Fish Hawk," and the "Albatross" on the surface where the temperature was 72°, and at a depth of 2369 fathoms where the heat was less than 36° F. From the foregoing data this fish has a thermal range of 42.3° F. and a bathymetrical range of 2369 fathoms. This would indicate that the thermal limits to distribution are hardly more confining than those set by pressure; yet there is abundant evidence that particular species affect rather narrow thermal limits and are rarely found much beyond them. Comparatively the number of the species that leave the lower belt of light and approach the surface, crossing the "azoic zone," is probably small. If the fishes are able to sustain themselves in a temperature of freezing or lower there evidently is no barrier but distance to the passage of a migratory species through the Arctic Ocean from the Atlantic or the Pacific.

There appears to be a general modification attendant on the progress of the fishes from the shoals to the abysses in which the tissues become less firm, the bones more cartilaginous, the scales thinner, and the entire body in cases becomes almost gelatinous; but when in the depths the bodies are not supposed to be at all soft and flabby, compensation for the lack of firmness, from reduction in the amount of lime or other causes, being made by the weight of the water, the softness in specimens brought to the surface resulting from decrease in the amount of pressure.

A noticeable change in fishes that attends their departure from the sunlight on the way to the great depths is that of coloration: the spots, bands and other special markings common near the surface disappear and the appearance becomes uniform, most often of a dark brown to black, with, on those not habitually dwelling in the mud or the dark belt, an added assimilative or occultative tint to bring the surfaces into harmony with the pale greenish to yellowish green light of the ocean bottom. The change to the darker coloration is illustrated by several species of the Halieutoids figured below. *Malthopsis sparsa* of Plate XVIII., from depths of 200 to 322 fathoms has a coloration that fixes the species as an inhabitant of zones within the reach of sunlight at recent dates, possibly a portion of each year; generally it is grayish brown with yellowish to white reticulations surrounding brown spots, the whole fading rapidly in alcohol; the allied species, *M. spinulosa*, from 511 fathoms, Plate XXI., has retained the spots, marks of ancestry and of recent differentiation, but has become blacker and has lost the yellow and the white vermiculations; and *M. spinosa*, Pl. XXII., from depths of 1020 to 1270 fathoms lacks all spots and is uniform blackish. The pale greenish to yellowish or to bluish assimilative tint, seen on most of the colored plates herewith, is decidedly fugitive and disappears soon after death of the specimen, or after application of the preserving liquids; in many if not most instances it appears to be little more than the luminosity affecting the great majority of abyssal creatures. For instances see the sharks Isistius, Centroscyllium, and Chlamydoselachus, or the fishes Caulolepis, Dicrolene, Macrurus, and others. The occultative luminosity is generally distributed over the body and is to be distinguished from the monstrative light seen in the lanterns, flashlights, reflectors, lures, etc., of particular genera. The latter is a light pertaining to specialized organs of various species, is of a variety of tints, and serves on some fishes as means of recognition by kindred and on others to decoy and bring the prey within reach. The Scopeloids furnish good examples of the recognition marks (*signa*), and in the Pediculates instances are to be seen of a great variety of the lures (*illicia*). As is necessary for its discovery in the light in which it is used, the monstrative light is much the stronger; it varies in colors according to the genus or the species on which it is developed; and when in function is more or less completely under the control of the individual in respect to appearance, disappearance and brilliancy. The structure of the different monstrative organs on a number of the species has been well worked out by Lendenfeld in Günther's report on the deep sea fishes of the "Challenger Expedition." Creatures living in the ooze in many cases are of an intense black in which no luminosity can positively be asserted to exist; on such of these as are possessed of lures the latter are most often directed upward as if to capture a prey swimming above them, for instance Dolopichthys of Plate XIII. Many of the Stomiatoids and the Murænoids also are of the same deep black; it would appear as if the former inhabited the lower edge of the dark or azoic zone, their lures are extended downward as if to secure prey approaching from below.

The condition of the eyes of deep sea fishes is important evidence in support of the theory of an abysmal light; it also tends to establish the idea that this light in comparison with that of the sun is very weak indeed.

Most often the eyes of bathybial animals are larger than those of their kindred near the surface. Entire absence of light would have favored the deterioration and loss of the eye, but the eyes have become rudimentary in hardly a dozen of the multitude of known deep sea species. The list of the so-called blind forms of great depths includes *Benthobatis Moresbyi* Alc., *Typhlonus nasus* Günt., *Aphyonus gelatinosus* Günt., *Aphyonus mollis* G. B., *Barathronus bicolor* G. B., *Alexeterion Parfaiti* Vaill., *Tauredophidium Hextii* Alc., *Sciadonus pedicellaris* sp. n., *Leucicorus lusciosus* sp. n., *Dysomma bucephalus* Alc., *Dysommopsis muciparus* Alc., and *Myxine circifrons* sp. n. Other species of Myxine should be included in a complete list of marine blind fishes, but the loss of the eyes in this genus is to be attributed to parasitic habits rather than to bathybial conditions. Benthobatis, a recently discovered Torpedo, is the only blind Selachian known. Eight of the others on the list are Brotuloids, and two, Dysomma and Dysommopsis are Murænoids. In all these cases, Myxine being excepted, the eyes have become rudimentary and are more or less inefficient as visual organs. The case of Leucicorus is peculiar in that the blindness is comparatively recent, if indeed the loss of the eye is not an old age character and subsequent in the individual to an ordinary useful organ in the early stages. Nearly all of the species on the list, excepting only perhaps Sciadonus and Myxine, dwell in the ooze, and on all of them compensation for the loss of sight appears in an inordinately developed Lateral Canal System. On Sciadonus, Plate F, figure 4, in addition to the increased prominence in the development of the system there are considerable sensory developments on the fins. This genus is more likely to have the habit of swimming freely at a distance from the bottom. The greatest amount of differentiation of the visual organs known among bathybial fishes occurs on Ipnops; here the ocular structures cover the whole top of the head and depart radically from the common definition of eyes, but, as Mosely has shown, they still retain the function of sight. Apparently they have the additional functions of flashlights and reflectors; they are to be seen on Plate H, figures 2 and 2a, as they appear on a fresh specimen. Two species of this extraordinary genus are now known, *I. Murrayi* and *I. Agassizii*, the latter from the present collection. Commonly in the modification of the eye the outer structures are the first to deteriorate, while the ball remains and gradually becomes very minute, as in Aphyonus and others, before final disappearance. In *Barathronus bicolor*, however, the ball has disappeared and the large orbit has undergone a modification which, so far as we know, has no parallel among the fishes unless it may be to a remote extent in the case of Ipnops, a genus belonging to a very different family. The floor of each orbit against the skull, is lined by an extensive sheet of silvery tissue, primarily the iris, so broad as to nearly meet its fellow from the opposite side on the top of the forehead. This concave lining directed forward and upward, and to some extent toward the side, probably in part serves as a reflector, but it contains a small spot of black pigment, a little backward of its middle, that may retain something of the retinal function. The cavity appears, from the alcoholic specimen, to have been filled with liquid kept in place by the thin transparent outer covering. Crude as the organs appear they no doubt served as eyes and also as reflectors and luminous organs (*signa*) for recognition. Possibly these organs of Barathronus indicate the course in development of the ocular tracts of Ipnops.

Most often on deep sea fishes the eyes and the lateral system are both well developed, but greater development of the system is likely to be attended by reduction in the size of the eye. On sedentary forms which mainly depend on tactile developments the eyes are minute, as on species of Ceratiidæ, for instance *Dolopichthys allector*, Plate XIII.; on others of which the main reliance is on sight the eyes are the larger. Free swimming forms with excessive tactile developments, again, like Bathypterois, Benthosaurus, Dicrolene, and Mixonus have the eyes much smaller, the size of the organ being inversely proportioned to the excess in the tactile organs. There are cases in which tactile papillæ and the lateral system are both highly developed, as on *Eretmichthys ocella*, for instance, but commonly when one of the two is greatly favored the other is more likely to be slighted.

In response to the demands of bathybial conditions the sensory organs of the Lateral Canal System have in many forms become modified from simple nerve papillæ of tactile functions to luminous, flashlight, and, in some at least, to electric organs of great complexity. As the system is given special treatment below, the reader is referred to it for further discussion.

In the gills there is evidence of a decrease in the amount of oxygen consumed in the depths as compared with that used in the breathing apparatus of fishes near the surface, and the decrease naturally is accompanied by a lessened amount of activity. The bathybial fishes have smaller oxygenating surfaces, the laminæ are reduced in size and in many cases the gills are reduced in number. Many of the Halieutoids have but two gills on each side, the first and the fourth arches bearing none, though in these instances it is not entirely safe to infer much concerning bathybial influences since what at first sight appears to have been induced by abyssal conditions was actually in the inception near the surface resultant from the acquisition of an illicium (bait and rod) with the consequent sedentary habit. While nearly all of the deep sea Halieutoids are two gilled, those dwelling near the surface are mostly two and one half gilled, the reduction having proceeded thus far at least without aid from deep sea conditions; yet there are some of the two gilled species that approach the surface, for instance *Dibranchus atlanticus* Pet., or *Malthopsis sparsa* sp. n., and these are more likely to represent the ancestors of the deep sea species than to have been derived from the latter.

Apparently the intestines have shortened with adaptation to life at great depths, as if the species were farther removed from dependence on vegetation as food, through decrease in its consumption by the prey. This is counterbalanced in many fishes by an increase in the size and distensibility of the stomach. Unfortunately removal of the viscera, some time in the early history of the collection, from the larger specimens has taken away a source of information concerning food and habits.

It is too early yet to say in which direction deep sea influences tend to modify the habits of reproduction, whether toward the egg laying or toward the ovoviviparous; it can only be said that many species lay eggs and many others extrude living young.

From conditions necessitating reduction in the amount of activity and adoption of more sluggish habits the muscles of some bathybial fishes have become excessively reduced, see *Dolopichthys allector*, Plate XIV., fig. 1. Besides the general modifications undergone in the skeletons, many have suffered great modifications in particular sections of the osseous structure from lack of the uses to which they were adapted by ancestors; a marked illustration of this occurs in the neural spines of Caulolepis which have so declined as to lie nearly parallel with the vertebral column, Plate XII., fig. 1.

Whether as much activity is possible in the midst of the great pressures surrounding bathybial species as exists in the species near the surface, the conditions of skeletons, muscles, fins, and gills indicate very plainly its non-existence. It may be said that activity such as exists near the surface cannot exist at great depths because of the diminished supply of oxygen, but, in the presence of freezing temperatures and intense pressure acting as conservators of organic tissue and preventing its disintegration, a supply of oxygen such as that existing in the surface waters is not at all necessary. The reduction of activity, from difficulty of movement in the nearly solid media under enormous pressure, from the extreme low temperature, and from the limited supply of oxygen, alike affects all the animals of the bathybial fauna, so that the equilibrium is practically unchanged and none of the species is either more or less at a disadvantage on account of the greater inertness.

The distribution of species is discussed in the general remarks on the different groups and is indicated in the lists that pertain to them; the distribution of genera is made a subject of special treatment below.

SPECIAL DISCUSSIONS AND DESCRIPTIONS.

HOLOCEPHALA.

Holocephala Müller, 1835, Vergleichende Anatomie der Myxinoiden, 10.

Of the occurrence of species belonging to this group in the region traversed by the expedition there can be little doubt; they occur at a comparatively short distance to the north and to the south, yet the absence of representatives in the material under examination limits the discussion in these pages to matters pertaining to the group in general as inhabitants of great depths.

One species of the genus *Chimaera* Linné, 1758, *C. monstrosa* L., has been noted by Vaillant, 1888, from a depth of 687 fathoms, off the Azores, and another species, *C. affinis* Capello, more often taken at great depths on both sides of the north Atlantic, is given by Günther, 1887, a range from 200 to 1200 fathoms, or by Vaillant to 1285. An egg referred to *C. monstrosa* by Alcock, 1892, from a depth of 410 fathoms, off the Coromandel Coast, probably belongs to a new species. *Chimaera Colliei* Lay and Bennett, 1839, is a shoal water fish that descends to depths of a hundred fathoms or more at particular seasons, off the coast of California. By some mistake the figure of this fish in the Zoology of Beechey's Voyage, Fishes, Plate XXIII., fig. 1, has been copied in the "Oceanic Ichthyology," Plate X., fig. 36 as "*Callorhynchus antarcticus.*" So far as now known, the species of Callorhynchus have habits similar to those of *Chimaera Colliei;* though the specimens secured have been taken at moderate depths, the species in all likelihood retreats at certain times to greater depths, as is the case with most Selachians and Fishes. It will be evident on comparison with the egg figured below, Plate LXIV., fig. 2, as that of *Callorhynchus antarcticus*, that Günther is probably correct in identifying the egg figured by J. Müller, 1842, Ueb. den Glatten Hai, Taf. 6, fig. 3, and that figured by Duméril, 1865, Poiss., I., Pl. 8, fig. 8, as eggs of Callorhynchus, the opinions of Vaillant, 1888, Trav. et Tal. Poiss., 80, and of Goode and Bean, 1896, Oc. Ich., 31, to the contrary notwithstanding. The egg figured by Alcock, 1891, Ann. Mag. Nat. Hist., (6) VIII., fig. 1 on p. 22, as "Callorhynchus? sp." is intermediate between the egg of *C. callorhynchus* herewith figured and that figured by Günther, 1889, Ann. Mag. N. H., (6) IV., 416, as the egg of *Chimaera*. Evidently Alcock's figure does not represent the egg of *Callorhynchus callorhynchus* Linn., and, though it may ultimately have to be transferred to another genus, it might for the present be cited as *Callorhynchus indicus*. A recent addition to the group is the peculiar genus Harriotta of Goode and Bean, 1894, Pr. U. S. Mus., XVII., 471. This genus contains a single species, *H. Raleighana*, which possesses a known horizontal range included between the parallels of 36° and 40° of north latitude, and the meridians of 70° and 75° west longitude, with a vertical range so far as determined extending from a depth of 707 fathoms to one of 1081, off the eastern coasts of the United States.

Present knowledge of the distribution of the Holocephala of great depths is approximately set forth in the list of the known species below.

PLAGIOSTOMIA.

Plagiostomes Dum., 1806, Zoologie Analytique.
Plagiostomia Raf., 1815, Analyse de la Nature.

PLATOSOMIA.

Platosomia Raf., 1815, Analyse de la Nature.

Though outside of the Raiæ only one truly bathybial species of this group has been taken, there is abundant reason for believing the number will yet be greatly increased. The recent discovery of the blind Torpedo, *Benthobatis*, by Alcock, is a strong intimation that many if not all the different families of the flat-bodied Selachians, like the various shoal water Teleosts, also have their bathybial forms.

The material at present under study contains a single representative of the genus Raia, described below, but that one is of much interest on account of its locality, and its depth with one exception is the greatest recorded for the genus. The distribution of the deep sea species commonly placed in Raia corresponds somewhat closely with the distribution of the species of that genus known to be inhabitants of the waters near the surface. In many, possibly in most cases the latter are yet to be placed in both lists, their vertical ranges being more and more extended as investigations proceed. Beyond this the presumption appears to be warranted that further research only is needed to extend the deep sea range of this genus through all the great depths, it may be including the seas under the poles. The discovery of *Raia mammillidens*, from the Gulf of Manaar, at nearly six hundred fathoms, and of *Benthobatis Moresbyi*, off the Travancore Coast, at four hundred and thirty, by Alcock, are indications of what may be expected in future from the western and the southern parts of the Indian Ocean, or from the same portions of the Pacific, these waters having yielded very few Platosomia as compared with the northern and the western portions of the Atlantic, or with the eastern portions of the Pacific. *Raia mammillidens* Alc. is suggestive of the transition from Raia by way of genera like Discobatus (*Platyrhina*, Auct.) and Platyrhinoidis, to the Rhinobatidae, or vice versa.

RAIIDÆ.

Raiidæ Bonap., 1831, Saggio di una distribuzione metodica degli Animali Vertebrati, 99, 122.

Raja badia sp. n.

Plate VI., figs. 1 and 2.

The total length of the female described is ten and one eighth and the greatest width is six and three fourths inches, while the length of the disk to the ends of the pectorals is about five, or the length to the ends of the ventrals is six. Disk thin, nearly half of the total length, little wider than long, almost right angled in front, taking the general directions of the forward outlines, blunt at the snout, convex opposite the eyes and again near the outer angles, slightly concave at the sides of the snout and opposite the gills, sharper than right angled on the outer angles of the pectorals. Head one fifth of the total length, not very prominent on the top, as wide as long. Snout elongate, thin, broad, blunt; rostral cartilage weak, slender. Eye small, two fifths of the width of the interorbital space; orbit one fourth of the length of the snout. Width of mouth equal to four fifths of the distance from the end of the rostrum. Teeth small, about forty-four series across the upper jaws, in shape resembling a pair of small parallel disks united by a short narrow column, the upper of the disks being smaller than the base, covered with dentine, and bearing at its hinder edge a sharp slender cusp directed obliquely back and upward. Spiracle smaller than the eye. Gill openings small, width of the widest less than the length of the eye.

Dorsal fins equal, small, length less than half the width of the mouth, not separated by a spinous interspace, not united by membrane, close together, posterior nearly its length forward of the end of the tail. Ventrals divided by a deep notch into two lobes, of which the outer is narrow, slender, and equal in length to half the width of the mouth, while the inner is as wide as long and is broadly rounded on the hind margin from the notch to the blunted angle at the side of the tail. Tail slender, narrow, depressed, tapering gradually, acute, with a narrow dermal keel along the lower edge of each side.

Upper surfaces of disk and tail with rather closely set sharp spinules, closer together and finer on the sides of the tail which are without large tubercles. A large tubercular spine stands in front of each orbit; another is located between the orbit and the spiracle, and a third behind the latter. A group of three large tubercles appears on each shoulder, the inner one being smaller than the outer pair. Between the occiput and the first dorsal fin there is a series of twenty-nine tubercles; and on the hinder portion of each pectoral, behind the shoulder, there is a scattered group of smaller ones. On the top of the outer end of the rostral cartilage there is a group of medium sized spines in a couple of series. Each of the larger tubercles is compressed and consists of a high swollen pedestal or base with sharp vertical ridges upon which is a sharp slender hooked spine, subtriangular in trans-section, excavated behind, resembling the claw of a bird. All of the tubercles are high; those on the tail are more compressed, becoming very narrow, blade-like, and more hooked. Entire lower surface smooth.

Chocolate brown, blackish on the tail; ventral surface like the dorsal or a trifle darker, except in a white area about the mouth and a smaller triangular one behind the middle of the shoulder girdle.

A couple of eggs which may or may not belong to this species were taken at stations 3357 and 3359. One of them is figured on Plate VI., figure 3. The egg case itself, without the tendrils, is two and one half by three and one half inches. The "horns" are mutilated; evidently they were of considerable length; their bases are stout and thick. Over the entire surface the case is covered with fine villi or pile, in longitudinal series, which though harsh to the touch gives the appearance of a soft rich black velvet.

Specimen 3357 from deeper water differs in a longer closer pile, in which the longitudinal arrangement is less evident, a possible indication of specific differences.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 05′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard
3357	6° 35′ N.	81° 44′ W.	782 "	38.5° F.	Green sand
3359	6° 22′ 20″ N.	81° 52′ W.	465 "	42° F.	Rocky

Raja borea nom. sp. n.

This is the species described and figured by Günther in the Fishes of the "Challenger" Reports, page 8, Plate IV., as *Raia hyperborea.* There are too many points of difference, however, to admit of retention in that species. *R. borea* is somewhat closely allied to *R. badia*, but is more robust, broader on the forehead, less sharp in the angles of the disk, less slender in the tail, and less uniform in coloration; it has a smaller number of tubercles all told, but has one directly above each orbit that is not found in the type described above. It agrees with *R. badia* in the group of tubercles on each shoulder, but has a smaller number in the dorsal series.

Compared with *R. hyperborea, R. borea* is less angular, shorter in the snout, longer in the tail, and has a large tubercle above each eye and another on each shoulder between the outer pair and the vertebral series, both of which tubercles are lacking on the type of *R. hyperborea.* The colors of *R. borea* are "Grayish brown above with a trace of a darker spot on each side of the body; lower parts white, with large subsymmetrical brown patches; in very young specimens the lower parts are uniform white." The *R. hyperborea* of Collett's figure is uniform dark grayish brown on the back, and white beneath with large subsymmetrical markings of brown toward the sides and around the edges. The lengths of the types secured by the "Challenger" varied from six and one half to twenty-four and one half inches. "Faröe Channel; depth 400 to 608 fathoms."

Raja hyperborea Collett, 1878, Forh. Vid. Selsk. Chra., No. 14, p. 7,—1880, Nordhavs—Exp., p. 9, Pl. I., figs. 1 and 2. The resemblance between this species and *R. badia* is not very close. *R. hyperborea* is distinguished by greater squareness in outlines as seen from above, including the ventrals in the disk, and by a shorter tail, by lack of the inner tubercle of the humeral group, by a smaller group of tubercles in the vertebral series, by greater uniformity in the spines of the back, and by the color of the ventral surface, where there is more of white than of brown. Length of the type about 20.4 inches. "Taken in lat. about 80° N., at sea, west of the northern coast of Spitzbergen, the most northerly locality, too, in which this genus is yet known to occur."

Among the known species of the genus the closest affinities of *Raia badia* apparently are not found in the species of the more immediate vicinage of its habitat, but rather with those noted above from the seas around the Faröes or northward and through them with the thornback of the eastern coasts of the United States, a variety of *Raia radiata* Don. With *R. equatorialis* J. B., 1889, taken by the "Albatross" between the Galapagos Islands and Ecuador, it does not appear to be very closely related, and the same statement may be made concerning species in northern waters off the coasts of North America to Alaska. Its affinities with the southern forms, of Chili and Patagonia, are only remote; *Raia brachyura* Günt. approaches as much as any of them, yet it is very different, and none of those from the eastern coasts of South America makes a nearer approach. Immediately across the isthmus also no very close kinship is to be noticed in either *R. Ackleyi* Garm., 1881, from the Yucatan Banks, or *R. alia* nom. sp. n., from the northern portion of the Gulf of Mexico. The specific designation *Raia alia* is here first applied to the type figured by Goode and Bean in 1896, Oceanic Ichthyology, Pl. VII., fig. 23, under the title *Raia Ackleyi*. *R. alia* differs from that species in lacking the wide space between the dorsals, in having closely set spinules on tail and back, in having a group of tubercles on the middle of the back, in having tubercles on the crown between the orbital series, in having series of tubercles on the lateral edges of the disk, and in the lack of spots on the upper surface, particularly in the lack of the large transversely oblong spot of brown on each pectoral opposite the forward part of the abdominal cavity. Still farther removed are *R. ornata* Garm., 1881, taken by the "Blake" off Alligator key, Florida, or *R. plutonia* Garm., 1881, taken by the same vessel off the coasts of South Carolina. In this connection it may be pointed out that the skate figured by Goode and Bean, 1896, Oc. Ich., Pl. VII., No. 24, as *R. ornata* is not of that species but is a very young specimen of *R. plutonia* or an allied form.

ANTACEA.

Antacea Raf., 1815, Analyse de la Nature.

SCYLIORHINIDÆ.

The commonly accepted orthography and etymology for the family name of the Dog-nosed sharks, "*Scylliorhinidæ*," is somewhat liable to criticism. As compounded by Blainville the generic term from which it is taken was made up of the Greek name of the dogfishes, *σκύλια*, caniculæ (see Aristotle, History of Animals, book VI. chapter X.), with that of the nose, *ῥίν*; whether correct in its original form, *Scyliorhinus*, is another question. In the common form of the name derivation is traced to *σκύλλω*, to rend or to mangle.

This family is unrepresented in the present collection. Species belonging to it occur on both sides of the area immediately concerning this paper: to the northward several types from considerable depths have been described by Gilbert and others, for instances *Scyliorhinus brunneus* Gilb., from the Gulf of California, and *S. ventriosus* Garm., from Acapulco and northward, are likely to descend to depths of more than a hundred and fifty fathoms at particular times; to the southward again, there are several species, of which one at least, *S. canescens* Günt., from the southwest coasts of South America, is entitled to a place in the list of deep sea Selachians. Off the Atlantic coasts of the United States and the West Indies two species from great depths have been discovered in recent times, *S. retifer* Garm., and *S. profundorum* G. B. Two species were discovered by Alcock, in the collections made by the "Investigator" in the northern part of the Indian ocean, one of which he doubtfully identifies with Günther's South American species *S. canescens.* To the list of species from the eastern Atlantic Vaillant has added three new ones from the collections of the steamers "Travailleur" and "Talisman," but one of them, *Pristiurus atlanticus*, is identified by Collett, 1896, with the earlier described *P. melastomus* Raf.

SQUALIDÆ.

Squalidæ Bonaparte, 1831.

The only member of this family obtained by the steamer "Albatross" in the vicinity of the Galapagos Islands is a species of the genus Centroscyllium, very closely allied to *C. Fabricii* from the western portion of the North

Atlantic, to *C. granulosus* from the Falkland Islands, and to *C. ornatum* from the Bay of Bengal and the Arabian Sea. Without access to the types it is difficult to determine the degrees of affinity. One of the more prominent differential features of the species described below, *C. nigrum*, is apparent in the five-cusped teeth, the teeth of each of the other species being described as tricuspid. A small badly damaged specimen, taken by the French steamer "Talisman," at a depth of more than eight hundred fathoms, "devant le banc d'Arguin," off the northwestern portion of Africa, has been identified by Vaillant, with some hesitation, as belonging to *C. Fabricii*. This depth is the greatest reported for the genus, though all of the species are recorded from depths of more than two hundred fathoms.

Of genera not reported in the "Albatross" collection a number of species occur at great depths. *Etmopterus spinax* has been noted from more than three hundred fathoms by Vinciguerra, as also *E. pusillus* by Vaillant, in the Mediterranean and the neighboring Atlantic. The occurrence of *E. pusillus* off the western coasts of the North Atlantic, noted by Goode and Bean, is to be questioned. The specimen taken by the steamer "Blake" off St. Kitts, is at hand, and apparently belongs to *E. spinax;* it has the spines on the scales, and the peculiar markings of deep black seen on that species on the lower portions and immediately behind the ventrals, especially on young and lighter colored individuals. Comparing it with the type specimen of *E. Hillianus* Poey discloses the fact that the latter would better be placed under *E. spinax* than under *E. pusillus*. All the Squalidæ commonly taken in the deep water fisheries off the coast of Portugal will probably appear in the list of deep sea species. This will include the species of Centrophorus, Centroscymnus, Scymnodon, Oxynotus, and others to which definite depths have not yet been assigned. The species of Centrophorus described by Günther, 1877, from Japan, have habits similar to those of the eastern Atlantic. The depths for the genus range from two hundred or more to a thousand fathoms, more or less, the greatest being that assigned *C. calceus* and *C. squamosus* by Vaillant. The same author gives a similar record, of six hundred and seventy-two to ten hundred and thirteen fathoms, to *Centroscymnus coelolepis*, and one of seven hundred and eighty-four fathoms to *Centroscymnus obscurus*, a new species, taken by the "Talisman" off the coasts of Soudan. According to Wright, *C. coelolepis* is taken by the Portuguese fishermen at four hundred to five hundred fathoms, and Goode and Bean state that it is "abundant on the offshore banks of New England, at the depth of two hundred fathoms or more." The greatest depth noticed for any of the species of Squalus is that by Vinciguerra, of three hundred and twenty-eight fathoms for *S. uyatus* Raf. in the Mediterranean.

Centroscyllium nigrum sp. n.

Plate I., fig. 2; Plate IV. and V., Anatomy; Plate LXIX., fig. 1, Lat. Syst.

The proportions and shape of this species are similar to those of *Centroscyllium Fabricii* Reinh., or of *C. granulatum* Günt. The type is moderately slender and elongate, and is compressed behind the shoulders; the body cavity occupies about three fifths of the entire length. Head large, broad, depressed, inclusive of the gill openings little more than one fourth of the total. Snout broad, in length nearly equal to the width of the forehead, broadly rounded across the front. Nostrils at the edge of the snout, nearer to the end than to the eye. Eye large, lateral, without a nictitating membrane; orbit with a more distinct angle on the back than on the front border. Mouth wide, inferior, curving forward moderately in the middle, where it extends but little forward of a line joining the hind borders of the orbits, with a short groove around each angle, from which another groove continues backward nearly half-way to the first gill opening. Teeth small, numerous; upper with three erect, slender, acuminate cusps, median cusp largest, and outer cusps each with a rudimentary cusp on the outer side; lower with five similar cusps, median largest, and outer two small, Plate IV., fig. 5, 6. Gill apertures five, hardly as wide as the eye, posterior two of each side closer together and near the base of the pectoral. Spiracles medium, superior, transversely crescent-shaped. Rostral ampullæ numerous, Plate IV., fig. 3, those of the top of the head numbering a hundred, more or less, and those below the snout nearly twice as many.

In the skull, Plate IV., fig. 1, 2, and Plate V., fig. 1, the affinities of this shark to *Squalus acanthias* Linn., to *Etmopterus spinax* Linn., and to *Centrophorus granulosus* Bl. Schn. and their allies are very apparent. The entire skull is shorter and broader and the rostral cartilage is broader and shorter than in either of the mentioned forms. The width across the olfactory capsules is considerably greater, but the post-orbital processes are nearly of the proportions of those of *C. granulosus*. Above the symphysis of the upper jaws on the lower side of the skull there is a slender process, Plates IV. and V., fig. 1. At each side of the mouth there are three labial cartilages, Plate IV., fig. 1. The two on the upper jaw, the premaxillary and the maxillary, are quite slender, and the anterior is shorter than the other. The one on the lower jaw is much stronger every way and widens toward its anterior extremity. In the branchihyal framework, Plate V., fig. 2, reduction has proceeded about as far as in any of the species mentioned above. The foremost hypobranchials have apparently consolidated with the anterior ceratobranchials. Behind the basihyal there are two basibranchials, the anterior one of which is short and joins the middle of the anterior border of the other one, separating the hypobranchials of the third pair, and itself meeting the hinder extremities of those of the second pair on its forward end. The hinder basibranchial is a large broad plate that narrows backward to a point; at each side it directly supports the lower ends of the fourth and the fifth ceratobranchials. If this condition is compared with what obtains in *Squalus acanthias*, see Gegenbaur, 1872, Das Kopfskelet der Selachier, Pl. XVIII., fig. 3, it is found to be the case that in that species the branchihyals are rather less reduced, since it possesses three distinct pairs of hypobranchials, instead of only two, has its basibranchials separated by the hypobranchials instead of in contact, and has only the posterior pair of ceratobranchials, instead of the posterior two pairs, abutted directly against the sides of the hinder basibranchial. Thus in respect to the branchial skeleton the present species is the more specialized. On each side there are five extra-branchial cartilages. The small subquadrangular spiracular cartilage is nearly divided into three short bars.

The skeletal elements of the pectorals vary to some extent in individuals, see Plate V., figs. 2 and 4. Generally the propterygium, the mesopterygium, and the metapterygium are comparatively large and about equal in size, the first bearing one or two radials, the second three or four, and the third about ten, of which three or four of the posterior are unsegmented. There is an elongate basal cartilage in the skeleton of the ventral supporting about fifteen radials that are in most cases segmented near the distal end; anteriorly against the end of the pelvic element three or four additional radials have coalesced to form a single large plate of cartilage.

The viscera were destroyed. A few remnants are figured on Plate V., figs. 3 and 6. Figure 6 shows the heart with three series of valves in the bulbus. Figure 3 exhibits the internal arrangement of the intestine. The number of circuits in the spiral is small, only four or five, and a diagrammatic representation would somewhat resemble that of *Chimaera monstrosa* as given by T. J. Parker, 1879, in the Transactions of the Zoological Society of London, XI., Pl. II., fig. 6. The peculiar structural arrangement of the papillose ridges of the absorbing surfaces of the membranes within the intestine of *Centroscyllium nigrum* is to be seen on Plate V., fig. 3 of the present work. The cæcal appendage of the intestine is elongate and subcylindrical.

On the skin the scales are more or less distant from one another; they are small harsh tubercular spines, each of which has an erect or hooked slender grooved cusp, and a comparatively broad stellate base, Plate IV., fig. 7. The lateral system is rather simple; the arrangement of the canals on the head does not differ greatly from that of *Isurus punctatus* (Garman, 1888, Bull. Mus. Comp. Zool., XVII., Lat. Syst., Plate I.) or from that of *Isistius brasiliensis*, Plate LXIX,. fig. 2 of the present work, except perhaps in that the halves of the aural canal do not meet in the middle. This separation of the part of a canal on one side from the part on the other side of the head is noted in widely different genera, for instance on *Heptabranchias maculatus*, Lat. Syst., Pl. XIV., fig. 2, or particular canals on one or on both sides of the head may be similarly interrupted, as on *Somniosus carcharias*, Lat. Syst., Pl. XX., fig. 1, where cranials, orbitals, and occipitals are disunited. What credit for such breaks in canals ordinarily continuous may be given to individual variation is only to be determined by examination of a number of specimens of whatever species may be under consideration.

The fins are of medium size; the amount of fin area is much the same in dorsals, pectorals, and ventrals. The first dorsal originates very little backward of a vertical from the axil of the pectoral; the spine is triangular in cross section, concave or grooved on each side, and is shorter and more erect than that of the second dorsal. The origin of the second dorsal is little, if any, backward of the middle of the bases of the ventrals; the spine is about one and one-half times as long as the anterior spine, and is similar in structure but more hooked. On the tail the upper lobe of the caudal is separated from the lower by a distinct notch and is subtruncate on the hind margin; the lower lobe is the deeper, and has its lower angle slightly rounded off. Pectorals and ventrals are short, broad, and rounded on the margins, except in case of the hinder angle of the ventrals, which is sharp.

Deep black, with a narrow edging of white on each of the fins excepting the caudal.

This description is taken from a specimen of eleven and one-half inches in length.

On a small individual, of four and three quarters inches, slight differences in the outlines and in the positions of the fins are presented; the pectorals reach backward of the first dorsal spine, the spine of the second dorsal stands above the hind part of the bases of the ventrals, the eye is proportionally larger and the snout is shorter, the white of the margins of dorsals, pectorals, and ventrals is much broader, and the color of the muscular portions of the body is brown.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 fathoms	40.1° F.	Soft black mud.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Green sand.

SCYMNORHINIDÆ.

Scymnorhinini Bonaparte, 1846, in part.

The typical species of this family, *Scymnorhinus licha*, is a small shark of the Mediterranean sea and the neighboring parts of the Atlantic. It was first described by Broussonet, in 1780, under the name "*Liche*," afterward named *Squalus licha* by Bonnaterre, in 1788, and in the same or the following year described by Gmelin with the name *Squalus americanus*. In 1810, Risso described and renamed the species *Squalus nicæensis*. Blainville, 1820–30, fixed upon the name *Squalus* (*Acanthorhinus*) *americanus*. Cuvier first applied the name *Scymnus* to the genus. The compound *Scymnus lichia* was made by Bonaparte, who also named its subfamily *Scymnini*, subsequently, on account of prior application of *Scymnus* among insects, replacing these names by *Scymnorhinus* and *Scymnorhinini*. The family has been named *Dalatiidæ* by authors able to satisfy themselves that the species described by Rafinesque, 1810, as *Dalatias sparophagus* is identical with *Scymnorhinus licha*. The grounds for this conclusion appear to be the occurrence of the latter in the locality assigned the former, and absence of the shark actually described and figured by Rafinesque. The facts in the case are far from supporting the position. Bonnaterre's species, *S. licha*, has rather large spiracles, a smaller anterior dorsal situated behind the pectoral fins, a larger second dorsal the base of which is in part above the bases of the ventrals, a body chamber nearly two thirds of the total length, a deep and comparatively short caudal, and a black ventral surface; Rafinesque described and figured his type as having no spiracles, a large anterior dorsal above the pectoral fins, a small second dorsal "quasi adiposa," ventrals far in advance of the second dorsal, a body cavity less than half of the total length, an elongate narrow caudal, and white lower surfaces. Even if Rafinesque's Dalatias should be re-discovered it would be excluded from the present family by the characters given: Nessuno Spiraglio, due ale dorsali, senza ala anale, cinque aperture branchiali da ogni lato, coda disuguale obbliqua — *Oss.* Questo genere di *Squalini* differisce dal genere *Carcharias* per la mancanza dell' ala anale e da quello del *Squalus* per quella degli Spiragli." The names *Dalatiana* and *Dalatias lichia* of Gray, 1851, owe their existence to guesswork identification with Rafinesque's problematical species. The fact that *Scymnorhinus* inhabits the greater depths accounts for the scarcity of representatives in the museum collections. While its distribution has not been determined beyond the European seas it will probably be much extended by future research. Special interest is attached to the family, in this report, on account of the presence in the collection made by the "Albatross" of one of the closest allies of *Scymnorhinus*, of a genus of much wider known distribution and possessed of characters which in some respects are more than sufficient for generic distinction, as may be seen in the following diagnoses. The family may be subdivided thus:

Dorsals unlike; anterior smaller, in advance of the middle of the length; lower teeth with serrate edges; scales with an acute cusp or trowel shaped — *Scymnorhinidæ.*

Dorsals similar, nearly equal; anterior behind the middle; lower teeth with smooth edges; scales in pavement, without regular cusps — *Isistiidæ.*

ISISTIIDÆ.

This group is based upon a small shark which is readily distinguished from the *Scymnorhinidæ* proper by the backward position of the first dorsal, the tile-shaped polygonal scales, the absence of serrations on the cutting edges of the lower teeth, and the presence of a dermal keel at each side of the tail. Its body is rather long and rounded, its head is small and tapering; it has moderately large spiracles and narrow gill openings; and its teeth differ greatly in shape and mobility on the two jaws. Its fins, excepting the caudal, are all small; the dorsals differ little in size or shape and both are behind the middle of the body. The eyes are large, the nostrils are small and the body is phosphorescent. The single known genus is probably nocturnal and descends to great depths, though not an inhabitant of the bottom.

ISISTIUS.

Scymnus, Quoy and Gaimard, 1824, part.
Leius Kner, 1865, Denkschr. Ak. Wien, XXIV., Extr. p. 9 (Nov. 10, 1864), characterized.
Isistius Gill, 1865, Pr. Phil. Ac., 264 (Nov. 22, 1864), named.

Body elongate, subcylindrical, tapering backward, abdominal cavity long. Head moderate in size, narrowing forward, depressed. Snout subconical, blunt. Nostrils anterior. Mouth inferior, transverse, with a deep groove in front of the upper jaw and a deep fold behind each angle. Lips well developed; lower labial fold at the angle of the mouth, short, rounded, valvular. Teeth in the upper jaw small, raptorial, erectile, lanceolate, those of several series in function at once. Teeth of the lower jaw large, sectorial, erect, fixed, blade-like, the single series in function forming a continuous serrate-edged plate. Eye large, lateral; orbit circular in front, angled behind; no nictitating membrane. Spiracles medium, on the top of the neck. Five small gill openings, not in a groove. No anal fin. Dorsals small, without a spine, similar, anterior backward of the middle of the body. Caudal short and deep. A short dermal fold on the side of the tail. Lateral system tubular. Stomach very long; intestine short, with a spiral valve. Scales small, depressed, in pavement.

So far as yet determined the range of the known species extends throughout tropical seas to fifty-five degrees from the equator.

The generic name is given as accepted by others, though the records appear to favor the name Leius given by Kner.

Isistius brasiliensis.

Scymnus brasiliensis Quoy and Gaimard, 1824, Freycinet's Voyage, Zool., I., 198.

Squalus (Scymnus) fulgens F. D. Bennett, 1840, Narrative of a Whaling Voyage, II., 255; G. Bennett, 1860, Gatherings, 66.

Scymnus (Scymnus) brasiliensis Müller and Henle, 1841, Plagiost., 92, with varieties *S. torquatus* and *S. unicolor*, both of which are credited to Valenciennes; Dum., 1865, Elasm., 453.

Dalatias brasiliensis Gray, 1851, Chondropt., 76.

Leius ferox Kner, 1865, Denkschr. Ak. Wien, XXIV. (for 1864, Nov. 10), Extr., p. 10, Plate 4, fig. 2, described and figured.

Isistius brasiliensis Gill, 1865, Pr. Phil. Ac., 264 (for 1864, Nov. 22), name only; Günt., 1870, Cat., VIII., 429, described; Pet., 1876, Sb. Brl. Akad., 853, locality.

Plate I. fig. 1, Plate II., III., Plate LXIX. fig. 2.

Body elongate, subcylindrical, tapering behind the middle, slender in the caudal region, body cavity extending through the anterior two thirds of the total length. Head small, length to the hindmost gill opening less than one fifth of the total, subconical, depressed to a very low arch or nearly flat on the crown, wider than high. Snout short, blunt, rounded, hardly as long as the orbit, little broader than deep. Nostrils, small, anterior, rather close together. Mouth of medium size, inferior, slightly backward of a vertical from the hind border of the orbit, transverse, with a deep groove in front of the upper lip, and a deep fold behind each angle reaching more than half way to the first gill opening. Upper lip distinct, separate from the lower; lower labial folds lateral, short, narrow, rounded, at the angle of the mouth, attached to the labial cartilages, not extending toward the symphysis on the lower jaws. Upper teeth small, raptorial, oblique, acuminate, movable, in thirty-three longitudinal rows, several of the transverse series in function at the same time, Plate II., fig. 8; lower teeth large, sectorial, erect, fixed, broad, thin, sharp angled on the middle of the cusp, smooth on the cutting edges, decreasing in size from the median to the outer tooth, which is shortest and broader, interlocking on the edges so as to form a continuous saw-like plate of thirty-one teeth, all of which are in function at once, Plate II., fig. 9. The number of teeth noted by Günther (25) and that by Kner (26) were taken from young individuals. Eye large, nearly one sixth of the length to the hindmost gill aperture; pupil round; orbit longer than high, not angled in front, with an angle on the hind border where the upper edge overlaps the lower; no nictitating membrane. Spiracles moderately large, superior, nearly transverse, Plate II., fig. 1. Gill openings five, narrow, half as wide as the spiracle, above the level of the base of the pectoral, not in a groove.

The Skull. As might be expected from external resemblances, there is much evidence of affinity in the skeletons of *Isistius* and *Scymnorhinus*, yet differentiation has carried Isistius the farther from all the other sharks, as may readily be seen in comparisons of the features in which it differs most from the species of Scymnorhinus. The skull, as seen from above, Plate II., fig. 3, is narrow and elongate, the width across the nasal capsules is about equal to that across the postorbital processes, or to that across the occiput. A distinguishing feature of prominence is to be seen in the rostral cartilage, which is reduced to a slender rod, rounded at the forward end, slightly attached to the cartilages below it between the nasal capsules, and tapering backward to a slight, possibly ligamentous attachment above the prefrontal foramen, Plate II., figs. 3 and 5. The openings for the passage of the ethmoidal canal and the ophthalmic branch are rather close together in a depression, and the supraorbital openings, so noticeable on other sharks, are minute or invisible. The aqueducts of the vestibule are shown in fig. 5; in fig. 3 they are hidden by projecting cartilage. The cranial chamber is deepest backward, behind the pituitary fossa; it loses depth rapidly forward and is suggestive of a comparatively greater development of the hind brain. Between the orbits the lower portion of the skull is narrowly compressed. The section from which fig. 5 of Plate II. was drawn was cut a little to the right of the middle; this has left intact the blade-like portion between the orbits, bounded anteriorly in the figure by the cut surface behind the nasal capsule, and posteriorly by that below the pituitary cavity, the line from this last to the lower surface being an accidental result of drying. As in Scymnorhinus the mandibles are very massive, and together they are so much wider than the skull that the hyomandibular lies transversely, with the end to which the lower jaws and the ceratohyal are attached higher than that attached to the skull. In normal position, what in fig. 4, Plate II., is the lower end of the hyomandibular rests against ceratohyal and meckelian, with its anterior angle against a solid, inward-directed process of the latter, that from the side, in fig. 4, presents the appearance of a separate cartilage. The upper jaws, quadrato-pterygoids, are compressed, blade-like, and twisted. At the symphysis the narrow lower edge of the skull rests in a deep notch between them. The teeth are situated on the hinder side of the lower edge. At the point of attachment to the lower jaw, immediately above the hindmost tooth in the latter, or over the junction of the labials, the outer end of the upper jaw appears as a short horizontal bar. Above the end of the upper jaw and forward of the inward process of the lower, fig. 4, there is a small subquadrangular spiracular cartilage. Behind each half of the lower jaw, in fig. 4, Plate II., behind the end of the broadened lower labial, there is an unnamed subcrescentic, very thin, apron-like cartilage, strongly invested in ligamentary tissue, underlying the ends of ceratohyal and basihyal. Rudiments of these cartilages are to be seen in the same positions on *Scymnorhinus licha,* where apparently they are in process of acquisition.

The basihyal is wide and strong, and is deeply excavated on its lower surface for the ends of the ceratohyals, which it overlaps considerably. Behind this arch the branchihyal skeleton is decidedly feeble, Plate II., figs. 6, 7. In the specimen at hand the basibranchials appear to be obsolete, unless, perhaps, exception is to be made for a couple of short longitudinal bars of cartilage lying between the ends of the hindmost branchihyals but not in contact with them. The lower ends of the ceratobranchials taper to points that are neither in contact with one another nor with the basihyal; the anterior ceratobranchial is short and does not extend down as far as either of the others. Below the ceratobranchials the extrabranchials form an irregular sheet of cartilage as thin as paper, Plate II., fig. 6. In figure 7 a dorsal view of the branchial skeleton of the right side is given, the forward portion being turned to the left. The segmentation of the second and third pharyngobranchials in this figure is no doubt accidental, as also is the division between the hindmost two of the arches, where the epibranchials should be so united with and by the pharyngobranchials as to be a continuous cartilage.

A specimen of *Scymnorhinus licha* dissected for comparison with Isistius differs slightly from that figured by Gegenbaur, especially in regard to the branchial cartilages. It has three distinct basibranchials behind the basihyal, the second of which is like the first in shape and attachments and in being without the division near the middle as seen in the mentioned figure (Das Kopfskelet, Plate XIX., fig. 2). In this specimen the pair of basihyals immediately in front of the hindmost basibranchial are in contact on the median line and separate that basibranchial from the one next in front of it. There is, in fact, no trace of the small median plate marked "C‴" in Gegenbaur's figure.

In the bulbus of the heart there are three rows of valves, Plate III., figs. 4, 5.

Together the stomach and the intestine form a straight tube hardly longer than the distance from the gullet to the vent; they overlap at the pylorus only about one ocular diameter. The stomach is a long straight sac occupying five eighths of the length of the abdominal chamber; the intestine contains a spiral valve of about nine circuits, and has an elongate subcylindrical cæcal appendage, Plate III., fig. 3. The pancreas is two-lobed and lies against the stomach on the forward extremity of the intestine.

The shoulder girdle is very slender and flexible. Pro-, meso-, and metapterygia in the pectorals have coalesced so as to form a subquadrate plate articulated with the girdle. The small distal extremity of the propterygium and that of the metapterygium have the appearance of radials; the latter bears six radials, several of which are segmented into two series. On the mesopterygium there are five radials, each divided near the middle of its length, Plate III., fig. 6. In the skeleton of a ventral fin, Plate III., fig. 1, there is a strong basal cartilage, in three segments, bearing about a dozen radials, each also in three segments. The anterior radial, against the pelvic cartilage, was probably formed by coalescence of several radials.

The dorsal fins are small and similar in size and shape; their distance apart is equal to the distance of the posterior from the caudal fin or to the width of the head; the origin of the anterior dorsal is three fifths of the distance from the snout to the end of the caudal, its posterior angle is acute (mutilated in the specimen drawn), and the hinder part of the base is above the bases of the ventrals. The pectorals are small, nearly as wide as long, their angles are rounded off, and their bases are low on the side of the body. The ventrals are smaller than the pectorals, they are about twice the size of the dorsals, and they are shorter than the space between these fins and almost entirely below it. The caudal fin is short and deep, its lower lobe is two thirds as deep as long; the upper lobe is longer, subtruncate or convex on the hinder margin, and separated from the lower by a notch at the end of the vertebral column; the caudal pedicel is wider than deep, its depth is less than one fourth of that of the body, and it has a short low dermal keel on each side below the lateral line.

There is probably no shagreen better adapted for scouring purposes than that of the shark here described; its fineness makes it less desirable for covering the grip in the handles of swords. The scales are very small, they are subquadrangular in base and superstructure, and are arranged in regular series, in pavement, the individual scales being placed so as to present an angle forward and another backward. The outer surface has a low sharp keel surrounding a central area; in most cases this keel bears erect irregular projections, those at the corners rising highest. Scales that have been worn off on the top are shown on Plate III., fig. 7; the bases are shown in figures 8 and 9. At first sight this type of scale would be described as radically different from that of Scymnorhinus, but to a considerable extent the differences disappear on closer examination. On the scales of *S. licha* the superstructure is a sharp pointed and keeled retrorse spine rising obliquely from the hinder portion of the base and giving the entire scale a triangular appearance. The keel extends from the end of the spine forward across the base to the anterior angle. If the keel and the spine are cut away the scales are seen to be subquadrangular, somewhat as in Isistius, and their arrangement is similar in the two genera. The principal differences are those pointed out in the superstructures. The ancestor common to Isistius and Scymnorhinus probably had serrated teeth, spiny scales, a smaller middle and hind brain, and a branchihyal skeleton more like that of Scymnorhinus.

Lateral System. The lateral system is tubular and is not so complex as on many of the other sharks. From the aural region the corporal tube bends outward slightly to a point above the base of the pectoral, whence it runs directly to the tail, on which, a trifle below the middle of the muscular portion, it extends about two thirds of the distance from the origin of the lower lobe to the notch separating this lobe from the upper. On the head, Plate II., fig. 1, the aural tube crosses immediately behind the aural apertures. The occipital tube is comparatively long, cranial and rostral pass forward with tolerable directness. From the end of the occipital the orbital goes down to the angular and suborbital, which latter meets the nasal and the subrostral with or without the intervention of a short orbitonasal, below the middle of the eye. Immediately behind the buccal fold, from the corner of the mouth, the angular joins the oral, which continues forward to the end of the lateral lip. Behind the junction with the oral there is a short jugular. In front of the mouth the nasals meet in a very short median, from which the prenasals diverge forward to join the rostrals. The subrostral section of the tube goes directly forward from the suborbital for some distance, then curves out and upward to connect with the rostral above the nostril. All the sections of the tube, or tubes, present on *Isurus punctatus*, as on the figure shown in the "Lateral System," Plates I. & X., in Mem. Mus. Comp. Zoöl., XVII., are represented on Isistius, the short orbitonasal excepted.

There is more resemblance between these greatly differentiated genera in the lateral systems than in most other respects. Outside of the Scymnorhinidæ the closest affinities, as indicated by the lateral systems, are to be seen in the spinacoids; this will be sufficiently demonstrated by comparison with Centroscyllium, Plate LXIX., fig. 1.

The individual described represents the most common type of coloration; it is chestnut brown, darker on the back, and on the hinder portions of the caudal lobes. The hind borders of the fins, excepting the border of the upper lobe of the caudal, are light. Commonly a dark band crosses the throat; it does not show on specimens of very dark color. In life a remarkable feature of this shark is its phosphorescence. The peculiarity is well described by F. D. Bennett, 1840, from living examples. "The entire inferior surface of the body and head emitted a vivid and greenish phosphorescent gleam, imparting to the creature, by its own light, a truly ghastly and terrific appearance. The luminous effect was constant, and not perceptibly increased by agitation or friction. . . . The only part of the under surface of the animal which was free from luminosity was the black collar around the throat; and while the inferior surface of the pectoral, anal, and caudal fins shone with splendour, their superior surface (including the upper lobe of the tail-fin) was in darkness, as also were the dorsal fins, back and summit of the head." The luminous gleam was constant during the life of the captive, but declined and vanished when the shark died. G. Bennett, 1860, describes another specimen. "On placing my fish in sea-water and observing it in a dark cabin, it swam about for some time, emitting a brilliant phosphoric light; and when this had become so faint as to be almost imperceptible, it was readily rekindled on the animal being disturbed or excited. My specimen was of a perfectly black colour, and died about four hours after it had been taken. The luminosity was retained for some hours after life was extinct." These observations were confirmed by those of Professor A. Agassiz on the specimen here described.

The species is mature at a length of eighteen inches.

Station	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 06′ W.	1360 fathoms	36° F.	Globigerina ooze dk. sp.

The first unquestionable mention of this species is that of Quoy and Gaimard, 1824, in the Zoölogy of Freycinet's Voyage, I., 198, at the end of their description of *Scymnus bispinatus.* "Un autre très-petit individu femelle, pris par nous au Brésil, et nommé *Scymnus brasiliensis* par M. Cuvier, a à peu près la forme du précédent; mais il se fait remarquer par la grosseur démesurée de sa mâchoire inférieure, par sa gueule plus rapprochée de l'extrémité de son museau, par la largeur plus grande de ses nageoires dorsales, et par l'absence d'aiguillon aux ventrales. Les deux lobes de la caudale sont aussi plus profondément divisées. Enfin, sa couleur est d'un brun plus clair, et l'on remarque une large bande d'un brun foncé sous la gorge." In 1840, F. D. Bennett notes the occurrence of the genus in Lat. 2° 30′ South, Lon. 163° West, a ten-inch specimen captured in a tow-net at the surface, and again in "Lat. 55° North, Lon. 110 West," an eighteen inch specimen. Bennett's longitude is incorrect; it probably was 140° W. Müller and Henle, 1841, give Isle de France, St. Jago, and Rio de Janeiro as the localities of the specimens examined by them. G. Bennett, 1860, reports on a five and one half inch individual from Lat. 2° 15′ South, Lon. 163° West. Kner, 1864, gives the locality "Australia" for a seven inch specimen studied by himself. Dumeril, 1865, records one from Mauritius of more than nineteen and one-half inches, the largest yet recorded. Günther, 1870, had a ten inch specimen from the South Pacific and a six inch specimen from the Gulf of Guinea. Peters, 1876, had one from Lat. 14° 23′ 07″ South, Lon. 118° 16′ 03″ East, in the Indian Ocean. The "Albatross" collection adds a locality near the Galapagos Islands, station 3413, Lat. 2° 34′ North, Lon. 92° 06′ West. The depth given for this station is 1360 fathoms. In the same haul Bathytroctes and other undoubted deep sea forms were taken. The large eyes and the phosphorescence of Isistius certainly would not be out of place at very great depths; yet in view of the fact that all of the captures previously noted were from the surface or from depths much nearer to it than that reported by the "Albatross," and of the fact also that the trawl was open on its way up, there is still some uncertainty as to whether this shark descends so far.

From the data at hand it is not possible to determine the variation in the specimens taken at these widely distant localities. It is true that Günther found but twenty-five teeth on the lower jaw of his specimen, and that Kner's specimen had but twenty-six, but it must be remembered that these specimens were ten inches or less in length while the individual taken by the "Albatross," having thirty-one teeth on the lower jaw, has a length of more than eighteen inches, which at once raises questions as to differences in this respect on account of age.

CHLAMYDOSELACHIDÆ.

Chlamydoselachus anguineus.

Chlamydoselachus anguineus Garman, 1884, Jan. 17, Bull. Essex Institute, Vol. XVI., with figures; 1884, Feb. 1, Science, p. 116; 1884, March 21, Science, p. 345; 1884, Nov. 28, Science, p. 484; 1885, July, Bull. Mus. Comp. Zoöl., Vol. XII., No. 1, with 20 plates; 1885, July, Proc. Amer. Assoc. Adv. Sci., 537; 1887, March 18, Science, p. 267.

Didymodus anguineus Cope, 1884, March 7, Science, p. 275; 1884, April, American Naturalist, p. 412; 1884, May 30, Science, p. 645; 1884, "Printed July 1," Proc. Amer. Phil. Soc., p. 572.

Plate LXX., Lateral Canal System

This shark is one that may confidently be expected to appear in future collections from the region about the Galapagos. It occurs in both the Atlantic and the Pacific, like Isistius and Centroscyllium; it is of present interest mainly in comparisons. At different times the Museum of Comparative Zoölogy has come into possession of several specimens and opportunity has been taken to verify items originally derived from the type. As long ago as 1886, on the arrival of a second individual from deep water near Tokyo, Japan, it was seen that the tail of the type was deformed, as previously suspected, and the following note was printed by the writer in "Science," Vol. IX., No. 215, p. 267, March 18, 1887. "*The Tail of Chlamydoselachus.* A recent opportunity of examining a second specimen of Chlamydoselachus furnished the means of adding an item or two to our knowledge of that peculiar genus. In several points the example differed from that originally described. This was notably the case with the tail. On the later capture this organ was a little more than one-fourth of the total length, and, with the vertebral column, tapered to a sharp extremity; whereas in the first one it stopped abruptly, with vertebrae of considerable size, as if truncate. On the new one, the lateral line, with a few short breaks posteriorly, continued to within an inch of the end of the tail. All this indicates that the tail of that which served as the type was deformed and incomplete: the deformity, in all likelihood, being of embryonic origin. Proportioned as the new one, the tail of the type would have been seventeen inches long, instead of which it was but little more than ten. Completed, the type would have had a total length of sixty-six inches, to a circumference of eleven and a half. The more recent specimen had a length of forty-eight to a circumference of ten and a half inches, which made it rather less slender and snake-like than its predecessor. Another difference occurred in the dentition, which, in the last examined, showed variations in the number of denticles between each lateral cusp and the median: sometimes there were two, sometimes but one. The tropeic folds, abdominal keel, were present as on the specimen from which the original description was taken."

Günther's "Challenger" Report, likewise of 1887, confirmed this and made important additions to knowledge of the anatomy from specimens caught in deep water in Yeddo Bay, opposite Tokyo, that is, about the locality from which the type was secured. The range was not extended until 1890, when Collett, Bull. Soc. Zoöl. de France, p. 219, published the fact of the occurrence of this shark off Funchal, Madeira. In 1897 he still further extended the distribution by the identification of a specimen taken in Varanger Fjord, Norway, at a depth of about one hundred and fifty fathoms. The last is the longest specimen yet taken, being about six feet three inches in length. It is a female, and compared with the males and females previously taken indicates that this sex is the larger. The shortness of the snout, and the position of the nostrils, in the colored figure of the head in Collett's paper (Særaftryk af Universitetets Festskrift til Hans Majestæt Kung Oscar II. i Anledning af Regjeringsjubilæet 1897, with 2 plates) would indicate specific differences, but comparison with his descriptions dispels any such ideas. If the Norwegian specimen is not identical in species with those from Tokyo it certainly is very closely allied. To be sure there are differences, as in the numbers of branchial rays, and the numbers of rows of teeth, but apparently these are, as Collett remarks, quite within the range of individual variation.

The discovery of a fossil Chlamydoselachus, *C. Lawleyi*, from the Pliocene of Tuscany, by Davis, Proc. Zoöl. Soc. Lond., 1887, p. 542, has added something to a knowledge of the early history of the genus; and beyond this some advance has been made toward the determination of relationships in the Carboniferous and earlier. The excellent work done by James W. Davis, by L. Döderlein, by Fritsch, and by a number of others, in the elucidation of the Pleuracanthidae has finally disposed of as non-existent the asserted affinities of Chlamydoselachus with Cope's Didymodus, 1884, that is, with Pleuracanthus of Agassiz, 1837. As now separated from the spine-bearing fish-like Pleuracanths, Xenacanths, with which it should never have been placed, the first suggestion, in 1884, regarding the allies of Chlamydoselachus is seen to retain its pertinence; the affinities are to be looked for away back among the Cladodonts, "probably earlier than the Carboniferous." The idea that the Cladodonts were distinct from the Diplodonts, of the Xenacanthini, the Pleuracanthidæ, is well supported by the fossil Cladodont restored by Dean, 1894, under the name "Cladoselache" (see "Fishes, Living and Fossil," 1895, p. 79, fig. 86), from the Cleveland Shales of the Ohio Waverley (Lower Carbon). This form evidently was a true shark with Cladodont dentition and no dorsal spines; it has no close resemblances to Chlamydoselachus, yet it is sufficiently near to lend support to the theory that the ancestors of the latter had separated from the Diplodonts, the Pleuracanths, and Teleosts at a much earlier date, and to justify search for a Cladodont without dorsal spines, with more than five gill openings, with longer dorsal and anal fins, and with a tail somewhat nearly diphycercal, from which to trace the descent of the Chlamydoselachidæ.

The name originally applied to the genus was Chlamydoselachus, from χλαμύς and σέλαχος; Günther's change to Chlamydoselache is not to be countenanced, σελάχη being the plural form. Similar criticism is to be applied to Selache of Cuvier, 1817 (=Cetorhinus Blainville, 1816), and to Cladoselache of Dean, 1895, generic names which are better written Selachus and Cladoselachus.

To remark upon one more of the numerous entries in a complete bibliography of the genus it may be pointed out that the diagnoses and descriptions occupying pages 22, 23, and 24 of the "Oceanic Ichthyology" by George Brown Goode and Tarleton H. Bean, 1896, are transcribed word for word, without quotation marks, but with changed punctuation, from the article, "An Extraordinary Shark," in vol. XVI., 1884, of the Proceedings of the Essex Institute. It is indeed gratifying to know that the article was so highly appreciated as to demand an expenditure of so much energy as was necessary in making all the changes, yet it is greatly to be regretted that the text was not improved by the transformation at the same time that it was made to appear as if original with these authors.

Lateral System. In the work on the Lateral System published in the Bulletin of the Museum of Comparative Zoölogy, vol. XVII., 1888, p. 57, the cephalic canals of Chlamydoselachus were traced from the openings on the surface of the skin. Whether the diagram thus obtained agreed accurately with the course of the tubes within could only be determined by dissection, which was accomplished later and the results are given on Plate LXX. It will be seen that in the two cases the diagrams are in close agreement. The most peculiar features of the system in the genus appear in the presence of gular (*g*) and spiracular (*sp*) canals, in the transverse median (*m*), and in the tranverse prenasals (*pn*) parallel with the nasals (*n*) for some distance at each side of the median. On individuals there is a manifest tendency to irregularity in the lateral canal just above the forward end of the caudal; on one specimen the line on the right side makes a sharp curve down at this point, then takes a straight course backward, but on the left side the line turns down, then up, and then down again, making a sinuous line for about an inch and a half before continuing straight back. Transverse median (*m*) tubes are not rare among the other selachia, as will be seen by reference to Prionodon, Alopias, Rhinobatus, Raia, Myliobatis, Rhinoptera, and Dicerobatis (Lat. Syst., Plates VI., XII., XXIV., XXV., XXIX., XLIX., LI., LIII.).

If Isistius and Centroscyllium are compared with this genus, Plates LXIX. and LXX. of the present work, gular and spiracular tubes are seen to be absent in the first two, and the median is longitudinal, the nasals are transverse, while the prenasals are continuations of the rostrals on the top of the snout. The connections of orbital (*orb*) with suborbital or orbitonasal (*on*) and angular (*ang*) are the same in each of the three cases. Whether the gular and the spiracular tubes of Chlamydoselachus are to be regarded as primitive features derived from a remote ancestry or whether they are more recent differentiations is yet undetermined, but perhaps the better conclusion is that they have accompanied the peculiar branchial structure from some of the earliest of the sharks.

TELEOSTEA.

ACANTHOPTERYGII.

PERCOIDS.

In present knowledge of the group there is little concerning species of the Percoids at very great depths. Possibly it is because of greater wariness and activity that they are so rare in our collections, yet it may be that their habits and activity prevent them being carried below the reach of the sunlight as readily as forms habitually resting on the bottom of the sea, like Pediculates or Ophidioids. While future collecting will greatly increase the numbers from the depths, it may do it without changing the proportions, as compared with other groups, to any very great extent. The greatest depth at which a species has been reported heretofore is that of *Brephostoma Carpenteri*, from the Bay of Bengal, at 1520 fathoms, discovered by Alcock and classed as one of the Serranidæ. The nearest approaches to this have been in the cases of an Anthias, from the western part of the north Atlantic, at 524, and an Epigonus, from the European coasts, at 530 fathoms. None of the others of the twenty-five or more species in the list descends below 350 fathoms. Each of the following divisions contains representatives of three to four of the genera: the eastern and the western parts of the north Pacific, the western part of the south Pacific, the eastern and the western parts of the north Atlantic and the northern part of the Indian Ocean. Anthias is the only genus found to be included in so many as three of the divisions; and from it, as from the others, there is little to be drawn relating to connections or affinities between types from the different regions.

SERRANIDÆ.

Liopropoma longilepis sp. n.

Br. r. 7; D. VIII, 12; A. III, 8; V. I, 5; P. 15; Ll. 78; Ltr. 4 + 26; Vert. 24.

In this species the form is moderately elongate and compressed; it tapers from the dorsal and the ventrals to the end of the snout; the depth is about one sixth of the total length, and the greatest width three fourths of the depth. Head equal to one third of the length from the snout to the base of the caudal, as broad as high, anteriorly wider than deep. Snout rather large, as long as the orbit, broad and somewhat truncate when viewed from above, acute as seen from the side, the extremity being the lower jaw extended forward of the upper. Mouth protractile, of medium width; cleft rising forward; maxillary nearly reaching a vertical from the hind border of the orbit, obliquely rounded on the end, three fourths as wide as the eye, bent downward behind the intermaxillary. Teeth small, in comparatively wide villiform bands on the jaws, in narrower ones on the palatines, and in a V-shaped group on the vomer. Tongue long, narrow, pointed, toothless. Eye large, prominent, hardly as long as the snout, less than one fourth of the length of the head. Nostrils small, widely separated; anterior tubular, at the lip; posterior immediately forward of the orbit. Interorbital space convex, width equal to two thirds of the orbital length. Operculum with three somewhat hidden and drooping spines, median strongest. Preopercle curved and finely serrated along the middle of its hind edge. Subopercle elongate, thin, flexible, extending back of the opercle in the long opercular flap. Flap rather wide, reaching above the base of the pectoral. Gill openings wide; membranes not united, free from the isthmus. Gill rakers slender, three plus nine, with four rudiments at each end of the series. Pseudobranchiæ well developed. Suprabranchial gland subtriangular, grooved in the middle.

Hinder extremities of the fins acute. Dorsal originating little backward of the axils of the pectorals, outline descending toward the end of the spinous portion, soft rays longer and increasing in length backward, longest ray filamentary, two thirds as long as the head, and reaching the base of the caudal. Anal origin below the fifth of the soft rays of the dorsal. Pectorals narrow, little longer than the ventrals. Ventrals small, close together, inserted below the bases of the pectorals. Caudal deep, lobes sharp, notch one third of the length of the fin, rounded.

Scales small, ctenoid, longitudinally striate, covering body, head, bases of the fins, and, to a considerable extent, the fin rays; those of the flanks nearly twice as long as wide. Lateral line complete, rising to within four scales of the fifth dorsal spine, thence gradually descending till not quite reaching the middle of the caudal peduncle. Four pyloric cæca. Longest specimen seven and one fourth inches.

Red in life; with a band of brown from each eye to the end of the snout, with a narrow white (or blue) band from the suborbital to the pectorals.

Some individuals are darker on the internarial region and on the crown, and have a faintly defined band of brownish along each side of the back.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3397	7° 33′ N.	78° 34′ 20″ W.	85 fathoms	57.3° F.	Stf. gn. m. brk.

Serranus Bulleri.

Serranus Bulleri Boul., 1895, Cat., I., 288, Plate 10.

B. 6; D. X, 12; A. III, 7; V. 6; P. 18; Ll. 49–54; Ltr. 5 + 13; Gill rakers 7 + 16.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 fathoms	57.1° F.	Rocky

Anthias eos.

Pronotogrammus eos Gilb., 1890, Pr. U. S. Mus., XIII., 62.
Anthias eos Boul., 1895, Cat., I., 324.

B. 7; D. X, 15; A. III, 8; V. 6; P. 17; Ll. scales 44–46, pores 40; Ltr. 3 + 14; Vert. 26. Crown and maxillary scaleless; tongue toothless.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fine gray sand
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Green mud

Anthias multifasciatus.

Pronotogrammus multifasciatus Gill, 1863, Pr. Phil. Ac., 81.
Anthias multifasciatus Boul., 1895, Cat., I., 323.

B. 7; D. X, 15; A. III, 7; V. 6; P. 19–20; Ll. scales 55, pores 50; Ltr. 4 + 18; Vert. 26. Entire head, including top and maxillary, covered by scales; tongue with a group of teeth.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3378	3° 58′ 20″ N.	81° 36′ W.	112 fathoms	55.9° F.	Brk. sh.
3397	7° 33′ N.	78° 34′ 20″ W.	85 "	57.3° F.	Stf. gn. m. brk.
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 "	58.4° F.	Rocky

CENTRISTHMUS gen. n.

General appearance like that of species of Anthias. Body strongly compressed, acute anteriorly; tail deeply forked. Mouth large, anterior, protractile; lower jaws longer; maxillaries exposed. Jaws with villiform and an outer series of larger teeth intermixed with canines; vomerine and palatine teeth; tongue smooth. Eyes large, lateral. Edge of preopercle serrate; a large spine at the angle. Opercle with three spines. Gills four; gill openings wide; membranes not united, free from the isthmus; rakers numerous, slender. A vertically elongate suprabranchial gland. Seven branchiostegal rays. A strong sharp antrorse spine on the middle of the lower edge of the urohyal. Scales small, ctenoid, covering cheeks and interorbital space, absent from bases of dorsal and anal and from snout. Lateral line complete, nearly parallel with the vertebral outline. Dorsal with ten spines and about fourteen soft rays. Anal with three spines and eight soft rays. Ventrals inserted below the bases of the pectorals, close together, each with a moderately strong spine and five soft rays. Pyloric cæca few. Vertebræ twenty-six.

Centristhmus signifer sp. n.

Plate LXIX. fig. 5, urohyal.

Br. r. 7; D. X, 13–14; A. III, 8; V. I, 5; P. 19; Ll. 110 scales, 62 pores; Ltr. 7 + 28; Vert. 26.

In its outlines this species bears some resemblance to *Anthias multifasciatus*, but the snout is larger, the lower jaw is more prominent, the head is less completely covered by scales, the preopercular spine is larger, and the scales are much smaller. Body much compressed, greatest depth nearly one fourth of the entire length, two thirds as deep and two fifths as wide as long, nearly straight from end of snout to nape or slightly concave above the eyes, little arched across the crown, vertical on the sides, hardly swollen on the narial region. Mouth medium, oblique; maxillary reaching a vertical from the middle of the eye, truncate at the end, which is half as wide as the eye. Teeth on the jaws in villiform bands, with a larger outer series, with one or two small hooked canines near the symphysis in front and one or two smaller ones close at each side of the symphysis a little backward of the first in the upper bands, and with one or two similar canines in front on each lower jaw and behind these near the middle of the cleft a smaller one or more; teeth on the vomer in a narrow V-shaped band, of which the tooth at the apex resembles the canines; palatine teeth in narrow bands, of one or two series. Tongue paliform, narrow, pointed, toothless. Nostrils superior, small, close together; anterior very small, with a short tubular valve; posterior near the upper half of the eye. Eye large, prominent, as long as the snout, more than one fourth of the length of the head. Preopercle with numerous fine and regular serrations on the hinder edge, with larger and more irregular ones on the lower edge, and with a large sharp compressed spine on the angle. Opercle with three flat spines, median stronger and nearer the lower, which is very weak. Margin of gill cover thin, concave on the edge both above and below the median opercular spine. Urohyal very long, as long as the snout and the eye together, upper portion thin, ending in a sharp retrorse angle; lower portion less compressed, hinder extremity a long sharp point, in front of which there is a groove on the lower edge, middle with a strong antrorse spine. By great length in the urohyal necessity of much forward extent in the shoulder girdle is obviated; in the present species the halves of the girdle are more nearly erect and straight. Gills four; rakers short, longest more than half as long as the eye, slender, nine plus twenty-four; membranes hardly united, free from the isthmus; suprabranchial gland of moderate size, bent forward in its upper half. Pseudobranchiæ well developed.

Origin of the dorsal above the upper angle of the gill opening; third spine very long, with its pennant as long as the head, other spines hardly as long as the snout; longest soft rays twice as long as the spinous. Anal medium, third spine longest, first spine below the first soft ray of the dorsal. Caudal three fourths of the length of the head, lobes sharp, notch deep and rounded. Pectorals smaller than the ventrals, pointed. Ventrals one third longer than the pectorals, reaching the spinous rays of the anal, inserted below the bases of the pectorals, third and fourth rays forming a very long point.

Scales small, ctenoid, covering body, cheeks and interorbital space, and to some extent the bases of the caudal fin and of the paired fins, absent from the bases of the dorsal and of the anal and from the maxillaries and the lower jaws, as also from a short transverse area behind the interorbital region. Lateral line complete, nearly straight to a point below the seventh dorsal ray, from which it is distant about seven scales, thence it continues nearly parallel with the vertebral outline to the base of the tail. Three large pyloric appendages. Air bladder of moderate size.

Color probably red in life, darker on the back with faint freckles of brown, with short streaks or spots of brownish on the crown, with cheeks and lower portions of head and body silver. In cases the scaleless area back of the crown is darker, and a darker shade in the middle of each scale gives the sides a streaked appearance.

Largest individual eight and one half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3397	7° 33′ N.	78° 34′ 20″ W.	85 fathoms	57.3° F.	Stf. gn. m. brk.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fine gray sand

SCORPÆNOIDS.

On the list of deep sea fishes there is a larger proportion of the Scorpænoids than of those provisionally grouped as Percoids. This is in accord with the differences in habits, the former being more habituated to the bottom and recovering higher levels with less facility when carried downward by impulse or accident. The greatest depth on the present record is that noted by Vaillant in case of *Sebastes Kuhlii* Bowd., taken by the "Talisman" off the "Banc d'Arguin" in 1274 fathoms, and again off the coasts of Soudan in 622 fathoms. The "Challenger" Expedition as reported by Günther secured *S. oculatus* C.V. in the Straits of Magellan in 345 fathoms, and *S. macrochir* Günt. off Inosima, Japan, at 365 fathoms. In the "Albatross" collections from the northwestern Atlantic, Goode & Bean identified *S. marinus* Linn. taken at depths of 55 to 917 fathoms; and from the eastern part of the North Atlantic *Scorpæna dactyloptera* De la Roche, in Vaillant's work on the fishes of the "Talisman," is given depths of 503 to 532 fathoms in the Mediterranean and off the Canaries. Species of the Scorpænoids that descend 100 to 250 fathoms are rather numerous; and it may be that all species, located where it is possible, range from the shoals to considerable depths. Between the Atlantic and the Pacific across the isthmus connections are more apparent and closer in this group than in the preceding; compare Scorpæna, Pontinus and Sebastes.

The detailed discussion of the Scorpænidæ has been transferred to the report on the shore fishes, excepting in case of two forms described below. One of the latter, *Pontinus furcirhinus*, properly belongs with the shore fishes, though descending to 200 fathoms or more. Specimens of small to medium sizes lacking the filaments and with jaws about equal in length have outlines resembling to some extent those of *S. diploproa* or *S. aurora* of Gilbert. The latter, however, have twenty-six vertebræ, rarely twenty-five, while the present form has but twenty-four. The specific name *furcirhinus* is given it because of the forked appearance of the upper jaws, due to the great bunches of teeth. The other form described here is a degenerate type, in which the air bladder is obsolete or rudimentary, the head is entirely covered with comparatively large scales, and the excavations in the skull for the lateral system are broad and shallow. In all respects it is evident this form is adapted to life at a great distance from the surface.

SCORPÆNIDÆ.

Pontinus furcirhinus sp. n.

Plate VII.

Br. r. 7; D. XII, 9 (10); A. III, 5 (6); V. I, 5; P. 17; Ll. 54 scales, 24 pores; Vert. 24. The figure given on Plate VII. will recall that of *Sebastes filifer* Val., a species to which the present evidently is somewhat closely related. The main outlines bear some resemblance to those of *Sebastes macrochir* Günt. Body moderately elongate, much compressed, tapering rapidly behind the pectorals, rising to the greatest height at the third or the fourth dorsal spine, whence the outline descends steeply to the snout; width two thirds of the depth, the latter less than two sevenths of the total length. Head large, one third of the entire length, width equal to the depth at the occiput, rough with keels and spines; crown flattish, without a transverse groove, but with a faint transverse ridge at the end of the interorbital space; with a moderately deep longitudinal groove between the eyes, and a low prominence on the internarial space. On the cheeks there are two strong divergent spines, behind the opercle, the lower of which ends a keel across the operculum; the preopercle bears a strong in most cases doubled spine, a continuation of the infraorbital series of four spines rising from a ridge, and below this spine, commonly, there is a wide space in which the majority of the specimens have a very small spine close to the upper edge, which also in the larger individuals ends a low ridge from the mouth; below the space mentioned there is a series of three short spines of which the foremost is more or less completely hidden; below the infraorbital ridge, above the maxillary, there are two strong hooked spines. At each side of the internarial space there is a small spine directed upward; between the eyes above each orbit there is a series of four sharp spines, and behind each of these series there is a couple of stronger spines at the back of the head. Snout blunt, nearly as long as the eye, most prominent in the rounded groups of teeth on the intermaxillary. Eye large, nearly one fourth as long as the head, very prominent. Interorbital space a groove of moderate depth. Mouth wide, rising but little forward; maxillary broad and truncate posteriorly, extending to or little beyond a vertical from the hind border of the orbit. Tongue broad, pointed in front, free at the edges. Teeth in villiform bands which, anteriorly on the jaws, end in large rounded bunches; Plate VII., figs. 2 and 3, shows the arrangement of the teeth on the jaws and the palate. Nostrils small, nearer to the eye than to the end of the snout; anterior smaller, with a short tube and a long, fringed dermal filament. Suprabranchial gland vertically elongate and grooved. Four gills, a short slit behind the fourth; lamellæ of medium length; gill rakers five plus eight, with several rudiments, longest one fourth as long as the eye, club-shaped. Pseudobranchiæ large. Scales of medium size, ctenoid, on large specimens bearing dermal filaments, Plate VII., fig. 1. The spines of the crown and of the dorsal fin also have filaments in many cases. The pore-bearing scales of the lateral line are modified, the tube being raised above the scale so as to form a longitudinal ridge along the flank. Cheeks, snout, top of head, and upper portions of maxillaries covered with small scales, mandibles and chin naked.

Dorsal origin above the upper angle of the gill opening, forward of the bases of the pectorals, spines toward the soft rays shorter; third spine on many of the specimens much longer than the second or the fourth, half as long as the head, on other individuals it is hardly longer than the spines at each side of it. This long spine is present on specimens of two and three-eighths inches in length, in one case both the second and third spines are long; and on others much longer, the third spine is short. Possibly the difference is sexual, but this cannot be determined from the material at hand. While apparently there are no differences that may be seized upon as varietal or specific in the specimens from different stations, they yet group themselves in some degree when compared; thus all taken at depths from 66 to 112 fathoms have the elongate third dorsal spine, but seventeen from depths of 127 to 210 fathoms have only the short form of the same spine. Inference from this is impeded by the fact that in a lot of five specimens from a depth of 182 fathoms there are three that have a long third dorsal spine, while on the other two that spine is short. On each of several individuals there are thirteen spines in front of the soft rays of the dorsal. Pectorals broad, pointed; rays simple, more or less prolonged beyond the membranes. Second spine of the anal much stronger and larger than the third, first spine below the first soft ray of the dorsal. Ventral reaching the vent. Caudal about two thirds as long as the head, truncate.

Pyloric appendages three. Air bladder large. This species has but twenty-four vertebræ; the nearest of the known species of Sebastes have twenty-six. On the largest specimens there are streamers on scales and spines; on the smaller ones the filaments are hardly noticeable, if present.

Apparently rose color in life, brownish red in alcohol, flecked with brown below the eye, on the side of the head, along the lateral line, at the base of the dorsal, and on the dorsal and the caudal. A darker area on the parietal region sometimes has a light centre. Some have three larger blotches of brown below the spinous dorsal and two more below the soft dorsal above the lateral line. Very small individuals are similar to the larger ones in color, but the bunches of teeth are less prominent.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. g. sh.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 "	57.1° F.	Rocky
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 "	58.4° F.	Rocky
3378	3° 58′ 20″ N.	81° 36′ W.	112 "	55.9° F.	Broken shells
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fine gray sand
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8° F.	Green mud
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Green mud
3397	7° 33′ N.	78° 34′ 20″ W.	85 "	57.3° F.	Stf. gn. m. brk.

ECTREPOSEBASTES gen. n.

Body much compressed, short, deep, caudal peduncle small. Head massive, entirely covered with scales; snout broad, blunt, lower jaw longer. Cephalic spines moderate, opercle with two. Mouth large, maxillary deep, with a longitudinal keel in the middle. Teeth small, in villiform bands on jaws, vomer, and palatines. Pseudobranchiæ well developed, a prescapular gland; seven branchiostegal rays. Scales small, thin, cycloid, covering snout, jaws, and chin. Lateral line wide, shallow; scales much differentiated. Dorsals continuous, with eleven spines. Anal short, with three spines. Pectoral deep, pointed. Caudal not forked. Stomach siphonal; intestine small, short; pyloric cæca few. Twenty-four vertebræ.

Ectreposebastes imus sp. n.

Plate VIII.; Plate IX.; Plate LXXI. fig. 1, Lat. Syst.

Br. r. 7; D. XI, 10; A. III, 6 (7); V. I, 5; P. 19; Ll. scales 60 ca., pores 27 ca.; Vert. 24. Shorter and deeper in form than most of the species of Sebastes; compared with *Sebastes diploproa* the depth is greater, and is maintained farther backward under the soft dorsal, thus giving the back a higher and longer arch and making the caudal portion appear shorter. Body much compressed, depth about one third of the total length, and greatest width about two fifths of the depth; caudal peduncle small, its greatest depth less than one fourth of that of the body; lower outline of the body much less arched than the upper. Head short, hardly one third of the entire length, two thirds as wide as deep; crown broad, convex transversely, descending rapidly in a nearly straight line from the nape to the intermaxillary prominence on the snout; sides nearly vertical. Excepting those of the preopercle the spines of the head are rather small and feeble; there is a short spine at each side of the nape above the occiput, another above each preopercle, and two smaller ones above each suprascapular; the spines above the eye or on the internarial area are hardly perceptible; at the anterior extremity of the suborbital ridge there is a short antrorse spine, backward from this one there are two rather close together directed down and back, below the orbit there is another, and above the end of the maxillary there are two more; there are five short preopercular spines, the third or middle one of which is the largest; and there are two opercular spines, the upper of which is the longer and more slender, the lower the stronger, both of them at the ends of a couple of ridges across the operculum. The excavations in the skull for the vessels of the lateral system are broad and shallow. There is a concave, dish-like depression above the eyes on the middle of the crown behind which the parietal region is higher and quite flat. Snout large, twice as wide as the eye, nearly as long as broad, blunt, most prominent in the symphyseal angle of the lower jaws. Nostrils superior, nearly midway from eye to end of snout; anterior smaller and provided with a short tube and flap. Mouth very large, cleft rising forward a little above the horizontal; maxillary more than half as long as the head, reaching backward of the orbit, with a longitudinal keel along its middle, subtruncate and as wide as the eye at the end. Teeth in villiform bands on jaws, vomer, and palatines, Plate IX., fig. 2. Eye small, hardly one sixth as long as the head, nearly two fifths as wide as the interorbital space. Gill covers with thin margins and weak spines. Gills four; lamellæ short; rakers three plus eleven (with several rudiments), slender, blade-like, acuminate, striate on the sides, denticulate on the inner edges, not as long as the eye. Pseudobranchiæ medium. Suprabranchial gland polygonal or subtriangular, with a depression in the centre. The stomach and other viscera are figured on Plate IX., figs. 3, 4. Scales thin, cycloid, irregular, those on the top of the snout and head comparatively large, those bearing the canals of the lateral system on the flanks much differentiated, being twice the diameter of those in adjacent series. Lateral line covered by a fold of the skin with scales; disks resting on larger scales, somewhat as on Lamprogrammus, Plate XXXIV., fig. 4, each as wide as two ordinary scales, twenty-seven from head to tail. The line makes a short upward curve from the head till above the axil of the pectoral, whence it is straight or but slightly curved until it reaches the middle of the caudal peduncle at the tail. Dorsal origin forward of the base of the pectoral; a shallow notch near the soft rays of the fin, rays varying in number from eleven plus ten to eleven plus twelve. Hinder margin of caudal subtruncate or rounded. Pectorals broad at the bases, pointed, median rays longest, reaching the middle of the base of the anal. Ventrals with a slender spine and five segmented rays.

Deep black over entire surface, and on the linings of the body cavity.

Largest specimen six and one-half inches in length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3403	0° 58′ 30″ S.	89° 17′ W.	384 fathoms	43.3° F.	Fne. gy. s. bk. sp.

BERYCOIDS.

This is one of the most widely distributed groups of the fishes; it includes a moderately large number of the living, and besides has an extensive representation among the fossil forms. Though at present known in greater part from the tropical waters, there is that in the fact of inhabiting levels at a temperature of thirty-six degrees Fahrenheit, or lower, which leads to expectation of members of the group at similar temperatures in all waters containing a proper food supply outside of the torrid zone. In the collection there are individuals belonging to eight different species of the group, but two of which have been described heretofore; one of them is the species described by Gilbert under the name *Melamphaës lugubris*, from nearly the same locality, the other is with some hesitation identified with Günther's *M. mizolepis,* originally described from south of New Guinea, more recently reported by Alcock from the Bay of Bengal. In making the necessary comparisons it was found that not so many of the species from the western Pacific were identical with others in the Mediterranean and the eastern Atlantic as has been supposed, and this has led to doubts of a number of which only descriptions are available with which to compare. In general it may be said that the affinities of the species in the collection, from the region about the Galapagos, are closer to those of the western Atlantic than to those of the western Pacific. In case of Caulolepis the species from the eastern Pacific is so nearly allied to that from the western Atlantic that they can hardly be separated by the characters ordinarily used in specific diagnoses.

Species of Melamphaës and of Stephanoberyx have been taken in the north Atlantic, Lat. 37° N., Lon. 73° W., at a depth of 2949 fathoms, the deepest as yet reported for the group. Species of Melamphaës have also been taken at 1998 fathoms off the Cape Verde Isles, at 2232 fathoms off the Galapagos, at 1375 fathoms in the southern part of the Indian Ocean, and at 1805 fathoms in the Bay of Bengal. Malacosarcus was secured at a depth of 2350 fathoms near the Low Archipelago in the Pacific. When properly completed a list of the species of this group belonging to a depth of 150 fathoms or more will no doubt include nearly or quite all of the family; at present a considerable number have no definite depths assigned to them.

BERYCIDÆ.

Hoplostethus pacificus sp. n.

Plate A. fig. 1; Plate X.; Plate XI. fig. 1; Plate LXXI. fig. 4, Lat. Syst.

Br. r. 8; D. V, 13–14; A. III, 9; V. I, 6; P. 19; Ll. 58 ca. scales, 28 disks; Vert. 27.

This species differs little from either *Hoplostethus mediterraneus* C. V. or *H. japonicus* Hilg. in general outlines; in many respects it agrees with them very closely, but it may readily be distinguished by less development in the anterior portion of the dorsal fin, by a greater development of the pectorals, and by a larger number of scales in the median series on the abdomen. Form much compressed, tapering rather abruptly backward of the body cavity, depth five elevenths of the length to the base of the caudal or five fourteenths of the entire length, little more than the length of the head.

Depth of head equal to its length, which is twice its width; forehead very convex, a prominent median ridge above the nostrils. Snout short, hardly as long as the eye, blunt, steep and strongly curved above the mouth, most prominent forward in the angle at the mandibular symphysis. Nostrils small, immediately in front of the eye; hinder larger, vertically oblong; anterior small, round, lower than the posterior. Eye large, prominent, one fourth as long as the head, less than the width of the interorbital space, considerably below the level of the top of the head. Skull deeply excavated for the lateral system; the channels of the system, between the bridges protecting the disks, are covered by very thin and delicate membrane in which there are numerous minute pores. Mouth large, oblique; lower jaw longer; maxillary visible backward of the nostrils, broadening till nearly as wide as the eye at the end, curving downward in the middle of the upper edge, not entering the mouth border, with a supplemental bone as long as the orbit. Teeth in villiform bands on jaws and palatines, absent from the vomer. A prominent angle at the mandibular symphysis, another below the articulary; a spine-like prominence behind the scapulary, and another at the angle of the preopercle. All exposed portions of the skull are roughened; the bridges crossing the canals of the lateral system are comparatively strong, though the bony structure generally is fragile. Edges of gill covers thin and membranous; operculum twice as high as long. Gills four; lamellæ of medium length; rakers six plus fifteen, acicular, shorter than the eye. Pseudobranchiæ moderately developed. Suprabranchial gland of medium size, vertically oblong or subelliptical, with a groove in the middle, resembling that of Lamprogrammus but not quite so annular. The position of this gland and the arrangement of the disks of the lateral system on the head, with several of the anterior disks of the body, are shown on Plate LXXI., fig. 4. Scales irregular, somewhat convex, more or less rough with ridges or crowded small spines or granulations, in about fifty-eight transverse series; scales of the lateral line twenty-eight, much larger, prominently convex, forming a strong ridge along the side. The scales of this line belong to alternate ones of the transverse series, but each scale in the line is so large as to crowd out the scales of the intermediate rows, thus forming a continuous row of large scales. In the median abdominal series there are about eighteen sharp scales, varying from fifteen to nineteen.

Dorsal origin midway from anterior nostril to end of the base of the dorsal, above the base of the pectoral, fifth spine as long as the eye, anterior segmented rays shorter than those of *H. mediterraneus* or of *H. japonicus.* Anal origin below the eleventh ray of the dorsal. Pectorals rather broadly rounded on the hind margin, three fourths as long as the head, inserted above the axils of the ventrals. Ventrals small, two thirds as long as the pectorals. Caudal peduncle sharp-edged above and below the bases of the fin rays.

The colors of a fresh specimen are shown on Plate A, fig. 1; the alcoholic colors are grayish brown, blackish toward the ends of pectorals and ventrals and toward the base of the caudal, black on the linings of the body cavity, and yellowish on the hinder portions of dorsal, anal, and caudal.

The skeleton is figured on Plate X., and Plate XI., fig. 1, shows the inside of a longitudinal section of the head.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3403	0° 58′ 30″ S.	89° 17′ W.	384 fathoms	43.3° F.	Fne. gy. s. bk. sp.

Trachichthys mento sp. n.

Plate XI. figs. 2–7.

Br. r. 8; D. 17–18; A. 12–11; V. 7; P. 14–16; I . scales 60 ca., pores 28; Ltr. 7 + 20 ca.; Vert. 27.

Excepting the caudal region, the outlines of the head and body of this species as seen from the side would approach the subelliptical; the caudal peduncle is slender and the caudal fin deeply notched. The form is much compressed; the greatest depth is one half, and the length of the head two fifths, of the distance from the snout to the base of the caudal. From isthmus to nape the outline of the head is nearly a semicircle; the length is less than the depth, and the width is two fifths of the latter; bones of the skull fragile, deeply excavated for the vessels of the lateral system; sides nearly vertical; crown very convex; a high ridge along the interorbital space. Snout longer than the eye, blunt, curving steeply to the crown, chin vertical in the anterior halves of the mandibles; symphyseal angle prominent, sharp. Mouth wide, almost vertical when closed; maxillary three fifths as long as the head, wider than the eye, and slightly indented on the hind border, upper edge bending up backward, lower edge not forming the border of the mouth, supplemental bone as long as the eye. Teeth very small, in villiform bands on the jaws, larger forward, in a small group on the vomer, and in narrow series on the palatines. Nostrils small, close together, immediately in front of the eye, anterior smaller. Eyes small, less than one fifth of the head length, shorter than the snout, equal to their distance from the mouth. Membranes covering the vessels of the lateral system between the prominent ridges at their sides very thin; disks approximating those of *Hoplostethus pacificus*, Plate LXXI., fig. 4. An angle of some prominence below the angular, another on the angle of the preopercle. Gills four; lamellæ short; rakers nine plus fifteen, longest equal the length of the eye, slender and sharp, rough on the edges; membranes hardly united, free from the isthmus; hinder edges of gill covers very thin. Pseudobranchiæ well developed. Scales mostly small, irregular, and rough with small spines, in fifty-eight to sixty or more series from head to tail and about twenty-eight from back to belly; those of the lateral system three times as wide as long, about twenty-eight in the series, deeply notched on the middle of the hinder edge. Individual variation in regard to the scales is shown on Plate XI., figs. 4 to 6; on some specimens a median line of large scales is present between the ventrals and the anal, somewhat as in most species of *Trachichthys*, but on others the variations lead to those on which the median series is quite undifferentiated. Fourteen pyloric cæca. Females of five and one half inches in length contain immense numbers of mature eggs.

Dorsal origin midway from snout to base of caudal, length of base equal to its distance from the front edge of the eye. Origin of the anal near a vertical from the tenth ray of the dorsal, end of the base opposite that of the dorsal. Bases of the pectorals little forward of the base of the dorsal. Insertion of the ventrals slightly forward of that of the pectorals. Caudal peduncle narrow, twice as long as deep.

In life this fish was probably rose-colored, with more or less of purple on the scaly portions; alcoholic specimens are brown tinged with purple on the body and whitish or yellowish on the head and fins; some individuals are blackish on the opercular regions and at the sides of the abdomen; linings of the body cavity blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. s.
3394	7° 21′ N.	79° 35′ W.	511 "	41.8° F.	Dk. gn. m.
3396	7° 32′ N.	78° 36′ 30″ W.	259 "	47.4° F.	Hrd. gy. m. s.

Caulolepis subulidens sp. n.

Plate B; Plate XII., Anat.; Plate LXXII. fig. 1, Lat. Syst.

Br. r. 8; D. 18; A. 8; V. 7; P. 15; Ll. 78 scales, 13 disks; Ltr. 11 + 36 ca.; Vert. 27.

Greatly compressed, high and blunt forward, tapering rapidly from the head to the tail. Head narrow, its width nearly half of its length, much deeper than long, the depth being nearly one half and the length about three eighths of the distance from the snout to the base of the caudal; crown twice as wide as the eye; skull deeply excavated on the top; sides vertical. Snout short, longer than the eye, most prominent in the longest pair of the upper teeth, very steep below the chin and forward of the eyes. Mouth oblique, very wide; maxillary nearly as long as the head, hidden in the anterior two thirds of the length, broadened and rounded posteriorly; premaxillæ forming the upper border of the mouth, with teeth-like granules on the lower edges, outside of the series of long teeth; mandibles much broadened in the middle, two fifths as broad as long. Teeth long, slender, awl-shaped, more or less hooked; each upper jaw with three teeth, of which the anterior is hardly as long as the eye and passes down in front of the lower jaw when the mouth is closed, and the second is less than half the length of the first or a little shorter than the third; each lower jaw with four teeth all closing within the mouth, the anterior nearly one and one half times the length of the eye, the third half as long as the first and longer than the second, which last is longer than the fourth. On the upper jaw the second and third teeth are directed obliquely backward and inward, while all of the other teeth are nearly vertical. The lower forward extremity of each of a couple of the branchial arches bears an irregular bunch of smaller teeth. A vertical band of half a dozen small teeth on the forward end of each palatine; vomer and tongue toothless. Skull bones thin and fragile, rough with deep excavations, ridges, grooves, and granules, as shown on the figures. Nostrils small, nearer to the eye than to the end of the snout; posterior vertically oblong; anterior smaller, rounded. Eye medium, little shorter than the snout, five elevenths of the length of the head. Gill cover indented in front of the pectoral, operculum scalloped. Gill openings very wide; membranes hardly united, free from the isthmus. Four gills; arches long, slender; lamellæ very short; rakers short, spine-like, nine plus thirteen. Pseudobranchiæ small, with fourteen or fifteen short lamellæ. A prominent angle on the preopercle, another below the articular, and one of moderate size below the symphysis of the lower jaws. A peculiar modification of the skeleton is apparent in the anterior vertebræ where the neural processes are short and declined toward the column, so that the supports of the dorsal fin are without the ordinary connection with the vertebral processes.

Fins very fragile; dorsal origin three sevenths of the distance from the snout to the base of the caudal, length of base equal to its distance from the nostrils; anal short, base twice the length of the eye, origin near a vertical from the fifteenth ray of the dorsal; caudal deeply forked, of nineteen long rays; ventrals inserted below the hindmost rays of the pectorals; pectorals narrow, one and one half times as long as the ventrals, reaching the lateral line but hardly reaching the vent.

Scales thin, small, with a spreading radiate base and a leaflike or cuplike crown which is more or less spiniferous, ridged, and angulated. See Pl. XII., figs. 6, 7. There are about eleven scales above and thirty-six below the lateral line in a transverse series, and about seventy-eight in a longitudinal row. Lateral system on the body a naked canal crossed by thirteen disks each protected by a large scale which forms a bridge over the channel. Plate LXXII., fig. 1, shows several of the anterior disks of the series as continued back from the head. With slight variations in the groupings on the interorbital space and below the eyes, the arrangement of the lateral system on the head recalls that on Dicrolene and Pteroidonus, Plate LXXV., figs. 1, 2; on Lamprogrammus, Plate LXXXI., fig. 1; on certain Gadidæ, Plate LXXXII., figs. 1, 2; and on other Berycoids, Plate LXXII., fig. 2. The stomach, pyloric cæca, intestines, and other viscera are figured on Plate XII., figs. 1, 2, 3. The stomach is comparatively large and has five cæca; the intestine is short; the vent is midway from the head to the base of the caudal. Normally there are eight branchiostegal rays; the foremost is small and slender and is not seen on fig. 5 of Plate XII.

The colors of the fresh specimen are shown on plate B; alcoholic specimens are deep black over the entire surface and on the linings of the body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3383	7° 21′ N.	79° 2′ W.	1832 fathoms	36° F.	Gr. glob. oz.

Melamphaës mizolepis.

Scopelus mizolepis Günt., 1878, Ann. Mag. Nat. Hist., II., 185.
Melamphaës mizolepis Günt., 1887, "Challenger" Deep Sea Fishes, 28.

D. III, 10; A. I, 8; V. I, 6; P. 14; Ll. 20 ca.

Compressed, high at the nape, greatest height about one fourth of the total length, greatest width about three fifths of the height, body cavity nearly half of the total length. Head large, two fifths of the length to the base of the caudal, half as wide as long, transversely convex, and nearly straight or with a slight longitudinal concavity on the top, much curved from the chin to the isthmus. Skull thin and fragile, with prominent ridges along the canals of the lateral system. These ridges give the skull a trough-like channel on the crown hardly as wide as the eye and extending forward to the interorbital space; above each orbit a kidney-shaped cavity; suborbital, opercular, and submandibular grooves deeply traced. The median keel below the chin, formed by the thin inner edges of the mandibles, is very prominent. The maxillary is almost entirely hidden by the suborbital expansions, and the orbital edges are well developed. Both preopercular ridges are prominent; operculum extended in a sharp point. Snout massive, nearly twice as long as the eye, blunt, the angle on the chin of moderate prominence. Mouth wide, oblique; lower jaws longer, much produced downward, forming a median keel; maxillaries extending below about half of the eye. Teeth very small, apparently in a single series on each jaw. Eye small, less than one sixth of the length of the head, and less than one half of the interorbital space. Gill rakers seven plus fifteen, little longer than the eye, compressed, acuminate. Pseudobranchiæ small.

Dorsal origin in front of half-way from the snout to the base of the caudal; base less than half the length of its distance from the snout. Anal origin below the ninth ray of the dorsal, seventh anal ray below hindmost dorsal ray. Caudal peduncle, from the dorsal, three fourths as long as the head. Bases of the pectorals forward of the base of the dorsal and backward of the insertions of the ventrals, fin long, extending above the greater portion of the base of the anal. Ventrals nearly one diameter of the eye forward of the pectorals, elongate.

Scales large, apparently about twenty along the lateral line.

Surfaces and linings of the body cavity deep black.

If not identical, the present specimens represent a species so closely allied to *Melamphaës mizolepis* Günt. that the description of the latter is insufficient for purpose of distinction. If identical, the range of *M. mizolepis* is much extended. It has been taken south of New Guinea off the Arrou Islands, by the "Challenger," in 800 fathoms, and in the Bay of Bengal, by the "Investigator," in 1310 fathoms, and from the following localities by the "Albatross."

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3388	7° 6′ N.	79° 48′ W.	1168 fathoms	36.2° F.	Gn. glob. oz.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 "	40.1° F.	Sft. bl. m.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Gn. s.
3398	1° 7′ N.	80° 21′ W.	1573 "	36° F.	Gn. oz.

Melamphaës lugubris.

Melamphaës lugubris Gilbert, 1890, P. U. S. Mus., XIII., 59.

Br. r. 8; D. III, 15–16; A. I, 7–8; V. I, 7; P. 14; Ll. 27.

The form of this fish is moderately stout and compressed; the outlines are similar to those of *Melamphaës nigrofulvus*, Plate D, fig. 2, and the agreement in the formulæ is close except in case of that for the dorsal fin, in which the number of rays is much larger for the present species. Body cavity more than half of the total length. Head large, two fifths of the length without the caudal; its depth is two thirds and its width less than one half of its length; the upper and the lower profiles are convex; there are moderate ridges at the sides of the parietal region and in the suborbital, the opercular, and the submandibular regions. The excavations in the bones of the skull for the canals and disks of the lateral system are wide and deep; apparently they are continued across the aural region of the crown. The short median interorbital ridge is of moderate height; the internarial prominence is low. There are one or two small spines at each side of the occiput. Snout short, one and one half times the length of the eye, ending in a point below the symphysis of the lower jaws. Mouth wide, oblique; maxillary more than half as long as the head, reaching to a vertical from the hind border of the orbit. Teeth small, subequal, in two or more rows on each jaw. Eye medium, lateral, one sixth of the length of the head, two thirds of that of the snout, less than half of the interorbital width. A couple of short spines at the lower angle of the preopercle. Operculum wide, thin, with a ridge from the hinge backward, membranous on the edges. Branchial lamellæ short; gill rakers five plus thirteen, compressed, lamelliform, blunt at the ends, longest as long as the eye. Pseudobranchiæ small.

Scales deciduous, rather large, with fine striations.

The distance from the snout to the origin of the dorsal is contained two and one fourth times in the length to the base of the caudal; the length of the base of the dorsal fin is equal to its distance from the bases of the caudal rays. Origin of the anal fin below the fourteenth ray of the dorsal; length of the base equal to the length of the eye together with that of the snout. Pectorals long, reaching backward of the first rays of the anal fin; the bases lie forward of the origin of the dorsal. Ventrals long, inserted below the bases of the pectorals. Caudal forked.

Entire surface, and the linings of the body cavity, deep black.

This species has been compared with *Melamphaës typhlops* Günt.; it differs from that species in having a larger anal, situated much farther forward, a longer dorsal, a larger eye, and ventrals that reach beyond the vent. The specimen originally described by Gilbert was taken by the "Albatross" in 1889 at station 2923; Lat. 32° 40′ 30″ N.; Lon. 117° 31′ 30″ W.; Depth 822 fathoms; Temp. 39° F.; Bottom green mud. The present specimens are from the stations noted below.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3388	7° 6′ N.	79° 48′ W.	1168 fathoms	36.2° F.	Gn. glob. oz.
3414	10° 14′ N.	96° 28′ W.	2232 "	35.8° F.	Gn. m.

Melamphaës nigrofulvus sp. n.

Plate D, fig. 2; Plate LXXII. fig. 2, Lat. Syst.

D. III, 12; A. I, 9; V. I, 7; P. 14; Ll. 27; Ltr. 8.

This species has a shorter caudal region, a larger head, and a smaller mouth as compared with *Melamphaës crassiceps* in Günther's figure in the "Challenger" report, Plate VIII., fig. B. The position of the anal fin, below the dorsal, would place the present type in the subdivision of the genus to which the name *Plectromus* is applied. In the figure given herewith the individual is represented as when first secured, yet allowance must be made for the loss or collapse of the membranes covering the head, in consequence of which displacement the ridges and spines of the skull are given a prominence not to be detected in the uninjured specimen. Form compressed, narrow behind the head, depth two sevenths and width one fifth of the length to the base of the caudal; body cavity more than one half of the total length. Head large, rather more than two fifths of the distance from the snout to the base of the caudal, height more than two thirds and width less than one half of the length, blunt, pointed at the snout, very convex on the top; skull with prominent ridges and processes enclosing the extensive chambers and canals of the lateral system; chin with a prominent median keel and two lateral keels on the mandibles, the median keel being formed by appression of the thin lower edges of the two bones. Snout massive, as long as the orbit, pointed. Mouth large, oblique, maxillary reaching below two thirds of the eye, lower jaws longer, with a sharp angle at the symphysis. Teeth small, subequal, in one or two series on the jaws, absent from vomer and palatines. Nostrils small, nearer to the eye than to the end of the snout. Eye medium, five eighths of the length of the snout, less than half of the interorbital space, about one sixth as long as the head. Ridges of skull more or less serrated; a prominent expansion at each side of the crown bending outward and bearing a spine at the scapular end; a prominent ridge above and forward of each orbit, another above each maxillary; a prominent spine on the middle of the internarial area, three small spines close together at the angle on the anterior ridge of the preopercle, and five short spines on the lower section and three or four on the upper section of the posterior ridge of the same bone. Operculum thin, with a longitudinal ridge ending in a short spine. Each scapular with a ridge above and a short outward directed spine at the side of the nape. Gill lamellæ very short; gill rakers eight plus twenty, longest as long as the eye, compressed, sharp pointed, ensiform; gill covers membranous toward the edges. Pseudobranchiæ small. Scales large, cycloid, thin, deciduous, concentrically striate with fine striæ. Lateral system greatly developed on the head, the disks resembling those of Lamprogrammus and others, see Plate LXXXI., obsolescent on the body.

Dorsal origin very little backward of midway from the snout to the base of the caudal, last ray above the seventh ray of the anal; anal origin below the eleventh ray of the dorsal. Caudal peduncle moderate, narrow, two and one half times as long as deep. Pectorals narrow, pointed, second ray reaching to hind end of base of anal (figured from an imperfect specimen on Plate D, fig. 2). Ventrals elongate, reaching the vent.

The colors of a fresh specimen are represented on Plate D, fig. 2; on those preserved in alcohol, excepting the fins, which have a lighter appearance, the surface and the linings of the body cavity are black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Green mud.

Melamphaës maxillaris sp. n.

Plate D, fig. 1.

D. III, 10; A. I, 8; V. I, 7; P. 14; Ll. 25 ca.

Compared with *Melamphaës nigrofulvus* the present type is distinguished by the large mouth, the dentition, the small eye, the smaller scales, and the backward position of the anal fin. The last mentioned would place this type between the species of the subgenus *Plectromus* and those of *Melamphaës* proper. Body somewhat stout, compressed, depth near one fourth, width nearly one sixth and length of the body cavity a considerable more than one half of the total length; depth of caudal peduncle two fifths of the greatest depth of the body. Head large, strongly arched on crown and snout, subvertical on the sides, length less than one third of the entire length, depth three fourths and width one half of its length. Snout large, broad, blunt, rounded at the end, more than twice as long as the eye, lower jaws longer, symphyseal angle prominent. Mouth very large, oblique; maxillary more than half as long as the head, reaching one diameter of the orbit farther backward than the latter. Teeth very small, equal, in bands of several series on each jaw. Eye small, less than half as long as the snout, less than half of the interorbital width, near one ninth of the length of the head. Bones of skull thin and fragile, deeply excavated; skull convex on the crown, with a low keel-like expansion at each side of the parietal region, a more prominent expansion above each orbit and extending forward of the nasal sac and down and back below the orbit, and another above each maxillary. Below the chin a pair of expansions, one on each mandible, meet and form a median longitudinal keel. Opercular ridges low and thin at the edges; upper edge of preoperculum with minute serrations or feeble spines; a sharp internarial spine immediately forward of which are two sharp spines at the upper ends of the premaxillary processes. Gill lamellae very short; gill rakers long, more than twice the length of the eye, becoming very slender in the outer half, acicular, six plus fifteen. Pseudobranchiæ small.

Dorsal origin behind the middle of the length of the body without the caudal. Anal origin on a vertical from the hinder end of the dorsal; base of anal little more than one third as long as that of the dorsal, equal in length to one third of its distance from the base of the caudal. Pectorals long, reaching backward of the anal origin. Ventrals below the bases of the pectorals, moderately elongate.

Scales large, thin, deciduous, cycloid, concentrically striate.

Deep black over the surface and on the linings of the body cavity, body probably with a purple or rusty tint in life.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3398	1° 7′ N.	80° 21′ W.	1573 fathoms	36° F.	Green ooze.

Melamphaës frontosus sp. n.

D. III, 14; A. I, 9; V. I, 8; P. 14; Ll. 30; Ltr. 9.

Shape resembling that of *Melamphaës nigrofulvus*, Plate D, fig. 2; distinguished by a smaller eye, longer snout, larger mouth, larger dorsal and smaller scales. Moderately stout and compressed, depth little less than one fourth and width two elevenths of the length to the base of the caudal. Head massive, five twelfths of the distance from the snout to the base of the caudal, very convex on the top, blunt and rounded anteriorly, lower edges of the mandibles forming a moderately prominent longitudinal keel. Snout broad and deep, twice as long as the eye; chin longer, with a somewhat prominent angle at the symphysis. Nostrils small, about halfway from the eye to the end of the snout. Mouth wide, descending obliquely backward; maxillary reaching little backward of a vertical from the hind border of the orbit. Teeth very small, equal, in a single series on each jaw. Eye small, about one eighth as long as the head, or one third as wide as the interorbital space. Skull thin and weak, with a serrate-edged expansion along each side of the crown and forward on the interocular area, another above each orbit and forward around the olfactory sac and thence backward below each eye, another above each maxillary, and two more below each mandible, the inner one of each pair forming part of the longitudinal median submental keel; preopercles with an anterior ridge bearing two spines behind the angle of the mouth, and a posterior ridge at the hinder edge bearing on the upper section about eight fine longitudinal ridges each ending in a point also about fifteen subvertical ridges and points on the lower section. Operculum with a longitudinal ridge which ends in a weak point. Gill covers very thin, striate. A moderate spine between the nostrils on the top of the snout. Gill lamellæ very short; gill rakers nine plus twenty-two, elongate, one and two thirds times the length of the eye, compressed, rather broad at the ends. Pseudobranchiæ small.

Dorsal origin about midway from the snout to the base of the caudal. Anal origin nearly below the eleventh ray of the dorsal, the seventh or the eighth anal ray being below the base of the hindmost dorsal ray. Pectorals long, slender, reaching the hindmost ray of the anal.

Scales large, cycloid, concentrically striate, thin, deciduous, more numerous and smaller than those of *Melamphaës nigrofulvus.*

Surface deep black, in life apparently tinted to some extent with yellowish brown; linings of body cavity black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3431	23° 59′ N.	108° 40′ W.	995 fathoms	37° F.	Lt. bro. M. Glob.
3430	23° 16′ N.	107° 31′ W.	852 "	37.9° F.	Bk. S.

SCOMBROIDS.

Except in one case none of the Scombroids in the list given below have been assigned to levels lower than 400 fathoms; the one exception is that of *Nealotus tripes* Johns., noted by Günther in the "Challenger" report from a depth of 2675 fathoms, but with the question whether the specimen may not have entered the dredge much nearer the surface of the ocean. In the present collection two genera are represented, each genus by a single species of which only one has a given depth, *Trichiurus nitens* sp. n., from 210 to 322 fathoms. This species is a close ally of *T. lepturus* of the Atlantic. The other species, that with which no depth is given, is, so nearly as may be determined at this moment, the species described by Lesson under the name *Lemnisoma thyrsitoides*, the *Gempylus coluber* of Cuvier and Valenciennes.

TRICHIURIDÆ.

Gempylus serpens Cuv.

It is not possible to determine from the descriptions whether the specimens from the Pacific represent a different species or variety from those found in the Atlantic. The fin rays of an individual in hand, which may belong to the form *G. thyrsitoides* Less., are numbered as follows:

D. XXX, 12 + 6; A. II, 11 + 6; V. I; P. 13.

Obtained off the Cocos Islands.

Trichiurus nitens sp. n.

B. 6; D. 120–127; A. 94–103; P. 11.

This species is closely allied to *Trichiurus lepturus* Linné, 1758. Compared with specimens of that species it differs enough, in length of snout, in size of eyes, and in numbers of fin rays, to warrant separation. The two forms are very similar in general features and without close examination would readily be passed as identical.

One individual of several at hand of the Atlantic *T. lepturus* has one hundred and thirty-four rays in the dorsal and one hundred and one in the anal, another has one hundred and thirty-seven dorsal rays and one hundred and six anal rays; the eye is two thirteenths of the length of the head; the length of the upper jaw from the eye forward is twice the length of the latter or a little more; the total length is eight times the distance from the snout to the base of the pectoral; and the depth is one sixteenth of the entire length.

In *T. nitens* the length of the head to the base of the pectoral is contained seven and one third to seven and one fifth times and the depth seventeen and one half to nineteen times in the total length. Body and head compressed, depth two fifths of the length of the head, tapering from the body cavity to a thread-like extremity in the tail. Head tapering, pointed at the snout. Snout elongate, pointed; upper jaws shorter, massive; lower jaws longer, more slender, bearing a pair of fangs in front of the ends of the upper jaws. Nostril moderately large, lateral, vertically oblong, near the top of the head, near the eye. Mouth wide, anterior, horizontal; maxillary hidden, extending but little below the eye, hind end rounded. Teeth small, compressed, sharp, in single series on each jaw, larger toward the middle of the series and very small toward the ends; three to four or more large fangs, each with a barb near the point, below the forward portion of the upper half of the snout each fang being nearly half as long as the eye. Eye large, lateral, one and three fifths to one and three fourths times in the length of the upper jaw from the front of the orbit, nearly five and one third times in the greatest length of the head. Wider than the interorbital space. Orbits rising above the outlines of the head, a sharp ridge from each passes back to meet in the median ridge on the nape. Forehead nearly straight longitudinally; interorbital space concave; crown narrowing backward to a point at the occipital crest; flat in the internarial region. Gill covers long, reaching above the base of the pectoral, flexible, striate as if containing a large number of fine rays. Four gills; rakers small, short, sharp; gill openings wide, membranes united for a short distance, free from the isthmus. Pseudobranchiæ well developed. Body cavity two and two fifths times the greatest length of the head. Seventeen pyloric cæca. Lateral line descending to a point near the end of the pectoral, thence continuing backward below the median line of the body, parallel to the lower edge, to the end of the tail.

Dorsal moderately deep in the middle, rays slender, longest ray half as long as the head, second ray above the upper angle of the gill opening, fin becoming rudimentary or obsolete backward on the tail. Anal fin rudimentary, traced by low compressed, blade-like spines the greater portion of which have a point directed forward in addition to that directed back. Pectorals small, pointed, as long as the upper half of the snout.

Sides brilliant silvery; lower half of the dorsal fin light; crown, upper edge of the dorsal, and the slender portion of the tail darker.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 09′ 45″ N.	80° 50′ W.	322 fathoms	46° F.	Green mud.
3389	7° 16′ 45″ N.	70° 56′ 30″ W.	210 "	48.8° F.	Green mud.

TEUTHIDIOIDS.

TEUTHIDIDÆ.

Teuthis elegans sp. n.

Plate L′, fig. 2.

D. 9 + 22; A. 3 + 21; V. 1 + 5; P. 14; transverse ridges, at the Ll., ca. 75.

The young fishes from which the following description is taken do not properly belong with the deep sea fishes; they are introduced, as is the case with several others of the pelagic species, for purposes of comparison.

Body and head much compressed, outlines from the side suboval, arch of back regular in curvature, and that of the belly more convex at the bases of the ventrals, and more straight along the base of the anal fin; depth nearly four-fifths of the length to the base of the caudal, or two-thirds of the total. Head deeper than long, length one-third of that from snout to base of caudal, width one-fourth of the depth of the body. Compared with that of *Teuthis triostegus L.*, the shape in this form is more rounded, less elongate; the body is more prominent at the ventrals, straighter along the anal fin, and the armature and the colors are quite different, though the formula of the fin rays is about the same in the two cases. Owing to the differences in colors, dentition, etc., it is not possible, in the absence of intermediate forms, to identify these specimens with the species described by Linné from India. Snout shorter than the eye, slightly prominent, blunt. Teeth compressed incisors, in single rows, bases narrow, crowns wider and convex; five of the anterior on each jaw larger, those of the upper series less convex on the crown, which latter bears six sharp subequal cusps, and those of the lower series, more convex on the crown, with five cusps, the median of which is the largest. Behind the upper teeth, toward each angle of the mouth, there are four narrow slender teeth, each with three cusps (some have five), and at the backward end of each lower series there are three similar ones. Eyes large, more than one-ninth of the total length, two-thirteenths of the length to the base of the caudal, five-twelfths of the length of the head. Gills four; pseudobranchiæ large.

Flanks and head crossed by file-like ridges, about seventy-five at the lateral line, each surmounted by sharp distantly-placed spines, alternating on the different ridges. These spines are grouped close together in threes to sixes on the ends of alternate ridges at the bases of dorsal and anal, where they form protections for the joints of the rays. More or less regularly, alternate ridges are shorter and end near the fins without a group of spines. The spines are more numerous and closer together on the sides of the caudal region. The post-oral ridges are vertical, the opercular ridges ascend obliquely backward, those of the crown are longitudinal, and those from the orbit and the occiput converge toward the first dorsal spine.

First spine of dorsal and of anal short; second longest (that of the dorsal as long as the eye and the snout) and bearing on the anterior edge a series of about nine denticles. First spine of the ventrals strong, smooth-edged. A smooth acicular erectile spine at each side of the caudal pedicel.

The lateral line approximates a parallel with the edge of the back; it rises somewhat abruptly above the bases of the pectorals, descends similarly at the caudal pedicel, and curves slightly above and behind the erectile spine.

The colors of a fresh specimen are shown on Plate L′, fig. 2. On alcoholic specimens the snout and chin, to a line joining the forehead above the forward part of the eye with a point midway from the lower jaw to the ventral fins, are light flesh color; behind this the forehead and the nape to the upper part of the orbit are black, and below this black area there is a broad band of silver descending quite across the side obliquely backward to include the base of the pectoral and the vent. Posteriorly from the silver band the body is of a somewhat deeper flesh color. On the tail there is a V-shaped mark of brown with the apex forward at the base of the erectile spine on the side, and behind this mark on the bases of the caudal rays there is a narrow transverse band of brown. Most specimens have a narrow edging of brown on the hind margin of the caudal, and a spot of brownish at the base of each ray of the anal fin.

Total length one and one-sixteenth inches.

Taken off the Cocos Islands at the surface.

TRACHINOIDS.

In the deep sea portion of the collection there are but two species belonging to this group, and these represent genera of very different habits. One of them is an uranoscopoid from the bottom, and the other a chiasmodont, affecting levels at a distance from the floor of the sea. The first of these, *Kathetostoma*, properly belongs with the shore fishes, but the records show it to have been taken at depths ranging from several to 210 fathoms. The second of them, *Chiasmodon*, is the genus in the group to which the greatest depth is assigned, 1,500 fathoms, by Günther, in the "Challenger" report. It was taken by the "Investigator" in 920 fathoms, and by the "Albatross" in 919. In the "Three Cruises of the 'Blake,'" A. Agassiz, 1888, II., p. 29, it is remarked of *Chiasmodon niger* that "most of the specimens known have been collected at the surface, and there seems to be a reasonable probability that this genus inhabits intermediate depths, since mid-depth fishes only have been found in its stomach." There is nothing in the appearance or the structure of the species described below to indicate that it differs in its habits from other species of the genus. A depth of 1260 fathoms is noted in connection with Bathydraco of the "Challenger" collection; all of the other depths on the list are less than 350 fathoms.

TRACHINIDÆ.

Chiasmodon subniger sp. n.

D. 10 + 28; A. 28; V. 5 (6); P. 15.

The similarity in outlines existing between this species and *Chiasmodon niger* Johns. is very close; so close in fact that with the likeness in other respects it apparently becomes necessary to modify the accepted diagnosis of the genus sufficiently to admit the form here described. Body elongate, compressed, body cavity more than half the total length without the caudal. Stomach and walls of abdomen very distensible. Head medium, naked, more than one fourth of the entire length, half as deep as long, half as wide as deep, throat narrow, sides nearly vertical; top with a shallow subtriangular concavity enclosed by low ridges on the interorbital space ending in a sharp angle between the olfactories, and another subcordate one on the parietal region. Snout narrow, one and one half times the length of the orbit, pointed, lower jaws longer. Nostrils nearer to the eye than to the end of the snout. Mouth very wide, cleft rising slightly forwards; maxillary two thirds as long as the head, narrow. Teeth slender, acicular, unequal, depressible, widely set; in two series on the upper jaw, anterior pair crossing one another in X-shape when depressed; in a single series on the lower jaws, anterior two or three pairs large; palatines few, movable; vomerines small, erect. Tongue narrow, paddle-shaped. Eyes lateral, large, about one sixth of the length of the head, above the middle of the maxillary. Gills four; gill openings wide; membranes hardly united; gill covers wide, edges membranous, ending in a narrow rounded flap above the base of the pectoral.

Skin thickly beset with fine spinuloid scales presenting a pilose appearance. Lateral line well developed on the head, in a groove on the body.

Anterior dorsal short, separated from the second dorsal by a notch, hinder rays shorter, origin one length of the eye backward from that of the pectorals, of ten rays; second dorsal long, origin nearly half way from snout to base of caudal, decreasing in height backward; anal long, origin below second or third ray of soft dorsal; caudal three fourths as long as the head, apparently with a shallow notch; pectorals narrow, more than half the length of the head; ventrals inserted below the pectoral bases, narrow, pointed, half as long as the pectoral fins.

Light brown with dots or puncticulations of darker over head and body; gill covers lighter; fins black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3429	22° 30′ 30″ N.	107° 1′ W.	919 fathoms	37° F.	Gn. m. glob. oz.

URANOSCOPIDÆ.

Kathetostoma averruncus.

Kathetostoma averruncus Jord. and Boll., 1889, P. U. S. Mus., XII., 163.

Br. r. 6; D. 14–15 (rarely 13); A. 13–14; V. 5 (6); P. 19; Vert. 28.

Rather short and stout, depressed, broad, rounded on the sides, deeper anteriorly, compressed toward the caudal; body cavity less than half the total length. Head large, less than one third of the total length, as wide and about two thirds as deep as long, crown and lower surface flat, sides convex, rough on the opercular regions and the crown; a ridge across the top behind the interorbital space. Snout broad, short, blunt, one and one half times the length of the orbit; chin prominent, nearly vertical. Mouth large, width more than half of the length of the head, vertical; maxillary broadened and rounded at the lower end, as wide as the orbit. Teeth small, unequal, in bands on jaws and vomer, larger teeth distributed in the inner series on the jaws, a few teeth on the front ends of the palatines. Eyes small, less than one fifth of the length of the head, two thirds of the interorbital width, prominent, superolateral. The sunken naked area on the interorbital space above the processes of the premaxillaries equal in length to the orbit, or to the strong sharp humeral spine. An irregular serrated bony ridge on each side between the humeral spine and the back of the skull; three short sharp spines below the opercles, the anterior two antrorse, the posterior one directed downward; a prominent angle below the articular; a short antrorse spine below the lower jaw near the angle of the mouth; two strong antrorse spines in front of the pelvis with a prominent and sharp angle between them. Gill openings wide, extending forward above the prepelvic spine; gill lamellæ elongate; pseudobranchiæ present. Nine pyloric appendages. Skin naked.

Fins rounded on the margins, fringed; dorsal origin one length of the orbit in advance of the middle of the total length, fin higher in the middle, rays extending beyond the membranes, not reaching the base of the caudal; anal not quite as large as the dorsal, originating and ending one or more rays farther backward, ends of rays reaching the bases of those of the caudal; pectorals short, two thirds as broad as long, truncate in the upper eight or ten rays, with long fringes, and with rays shortening rapidly forward, in the lower half; ventrals two thirds as long as the caudal, of six rays, posterior two rays longest, anterior ray rudimentary; caudal medium, subtruncate on the end, as long as the skull to the nape.

Brownish more or less spotted, blotched, clouded, or freckled with lighter, darker on the top of the head, blackish on the chin, shading on the flanks to the white of the lower surface; in most cases with a black ring around the base of the humeral spine and white margins on the fins; dorsal with an irregular longitudinal band in the middle; caudal most often with a V-shaped transverse band of white on the middle and another across the peduncle at the base; anal nearly white, blackish posteriorly; pectorals brownish with white spots and brown ones of variable sizes more or less irregularly arranged in transverse bands, varying to uniform brown with white margins. On some individuals there are rounded spots of white, as large as the eye, on the sides of the tail.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8° F.	Gn. M.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 "	62.6° F.	Fne. gy. S. G.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Gn. M.

LOPHIDIA.

The group of Lophidia is one of the best adapted to the evolution of deep sea species. Nearly all of the members rest and feed on the bottom, are sluggish and but poorly fitted for swimming. Having slid down toward the depths no great exertion could be expected toward the recovery of the upper level. From such conditions great variety of species and limited horizontal distribution of each follow as matter of course. That such is the fact is tolerably well supported by the material secured by this expedition.

Dividing the group into two, the Lophioids, in which the illicium (the bait and rod) is raised vertically and turned back on the top of the head, and the Halieutoids, in which the illicium is protruded horizontally in front of the head, it is seen that the collection includes four species of three genera in the first and twelve species of seven genera of the second of these subdivisions. In the first, one genus and three species, and in the second, three genera and ten species are undescribed. The two Lophiomi are allied to Lophius, but differ, as other species of the Pacific, in having but eighteen vertebræ. One of the two is remarkable for the details in the illicium; both were taken at less than 300 fathoms. Another of the first subdivision is an ally of Melanocetus; it is peculiar in the obsolescence of its vertical fins. The fourth is a new species of Chaunax, agreeing closely with the species previously known in details, yet, dwelling in the ooze, possessed of a compressed body, with a high nape, differences that may necessitate the establishment of a new subgenus (*Chaunacops*) to distinguish it from the depressed forms heretofore described. Like all species of Chaunax, though overlooked previous to the description of *C. Nuttingii*, the present species has a second dorsal spine on the skull, under the skin.

The representation of the Halieutoids forms a much larger proportion of the total number of known species belonging to the group; inclusive of several species described by others it contains about fifty per cent of this subdivision, and ten of the species are here described for the first time. Three genera are also characterized as new. It is a question whether it would not be quite as well to reduce the number of genera to about five, Halieutella, Oncocephalus, Halieutichthys, Halieutæa, and Dibranchus, and to treat the others, Zalieutes, Halieutopsis, Dibranchopsis (for *D. spongiosa* Gilb.), Dibranchichthys, Malthopsis, and Halicmetus as subgenera. The following table sets forth the present arrangement:

Gills 2½	Palatine and vomerine teeth present	Body and head subspherical		*Halieutella.*
		Disk depressed, subtriangular; a proboscis		*Oncocephalus.*
		Disk flattened, subcircular; no proboscis		*Halieutichthys.*
	Palatine and vomerine teeth absent	Disk flattened, subcircular; snout indented		*Halieutæa.*
Gills 2	Palatine and vomerine teeth absent	Disk subcircular; snout indented		*Halieutopsis.*
		Disk subtriangular; snout pointed		*Dibranchus.*
	Palatine teeth but no vomerine; disk subtriangular			*Dibranchichthys.*
	Palatine and vomerine teeth present	Disk subcircular	A dorsal fin	*Malthopsis.*
			No dorsal fin	*Halicmetus.*

The vertical range of the Halieutoids had been carried down to 902 fathoms; by the "Albatross" it is extended to 1360 fathoms, the greatest depth yet attained for the subdivision. The species from the upper levels exhibit the colors and ornamentation characteristic of those affected by the light of the sun. Most often the spots are absent from forms below 250 fathoms but in case of *Malthopsis spinulosa*, Plate XXI., spots are present at 511. At great depths dull brown to black, probably phosphorescent in life, appears most common, but in case of Halieutopsis there was a brilliant rose color, as on *Chaunax coloratus* of the Lophioids. Larger eyes most often appear among the species from greater depths, but the species taken at the greatest depth is the one with the smallest eye in the division. The esca (bait) of the illicium appears to be highly colored in some forms, and probably in all is more or less luminous.

So far as affinities are concerned, those of Lophiomus and Malthopsis reach toward species of the western Pacific, while those of Dolopichthys Dibranchus and Oncocephalus are closer to species across the isthmus in the Atlantic. The nearest relationship occurs between *Oncocephalus vespertilio* and *O. porrectus*.

LOPHIIDÆ.

Lophiomus spilurus sp. n.

Br. r. 6; D. 3 + 3 + 8; A. 6; V. 6; P. 17; C. 8; Vert. 18.

The shape of this species does not differ greatly from that of *L. caulinaris*. Evidently the two species are closely allied, but the present partakes more of the characteristics of forms belonging to great depths. *L. spilurus* is distinguished by a long slender simple first dorsal spine ending in a filament without a fleshy bait, by much larger teeth in specimens of equal size, by a simple humeral spine with a single backward directed point, and by the coloration. Disk about three eighths of the total length, longer than broad, much depressed, depth hardly one third of the width. Forehead troughlike, concave; face concave in front of the orbit. Snout broad, lower jaws much the longer, lower teeth exposed in front of the upper jaws, entire length in front of the orbits less than twice the length of the eye, width between the prenarial spines equal to that between the large spines above the hind edge of the orbit, symphyseal angle prominent. Mouth very wide, articular angle opposite the hinder part of the eye. Teeth unequal, acicular, depressible on the jaws, larger forward; those of the intermaxillary in two somewhat irregular series, of which the outer is more than twice as long as the inner and contains much smaller teeth; those of the lower jaws in a couple of irregular series, the inner of larger teeth, four or more of those near the symphysis being half as long as the eye; an erect tooth at each side of the vomer; a short series of four or five teeth on each palatine. Nasal sacs subspherical, on a short peduncle, nearer to the mouth than to the eye; nostrils small, anterior smaller on the front portion of the sac, posterior larger, and on the top. Prenarial spines two, prominent. Eye medium, length nearly equal to the distance from the mouth; supraorbital ridge and spines high and sharp. Behind the orbital spines there are two prominent post-orbital spines; a couple of smaller ones appear at the back of the skull, and two more at the outer edge of the operculum, the anterior of the two being directed forward. A sharp angle below the articular. Gills three; openings medium, transverse, at the hind edge of the disk below the pectorals. Pseudobranchiæ small. Two pyloric appendages. Skin soft, tender, with scattered filaments, the latter more numerous along the lateral line.

Fins all fringed; first dorsal spine forward of the nares, very slender and filamentary in the greater portion of its length, without a fleshy bait, in length equal to the distance from the end of the snout to the middle of the eye; second dorsal spine close to the first, much stronger and a little longer; third spine immediately forward of the occiput, like the others filamentary toward the end; a group of three spines (in one case but two) about half way from the third spine to the second dorsal. Second dorsal of eight rays (nine on one specimen), first ray midway from snout to end of caudal. Caudal narrow, median rays longer, length about equal to distance from mouth to occiput. Anal small, pointed, origin midway from orbit to end of tail; of six rays (seven on one individual). Pectorals narrow, somewhat sharp. Ventrals narrow, of six rays.

Clouded puncticulate dark brown to blackish behind the skull and backward; lighter forward; whitish on the lower surfaces; fins dark with white fringes; caudal with several, three to four, transverse series of white spots.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 fathoms	48.8° F.	Green mud.
3396	7° 32′ N.	78° 36′ 30″ W.	259 "	47.4° F.	Hrd. gy. M. S.

Lophiomus caulinaris sp. n.

? *Lophiomus setigerus* Gilbert, 1890, Proc. U. S. Mus., 454 (not = *L. setigerus* Wahl).

Br. r. 6; D. 3 + 3 + 8; A. 6; V. 6; P. 17–18; C. 8; Vert. 18.

Head and greater portion of the body together forming a depressed sharp-edged subcircular disk, one third as deep as wide and nearly as long as broad; caudal region moderately broad, tapering regularly from the body: body cavity more than half of the total length, extending about one length of the orbit backward of the disk. Forehead troughlike, concave. Snout broad, short, about half the length from the end of the lower jaw to the nape. Nasal sacs spherical, with the included lamellæ exserted like fleshy bulbs on a peduncle, nearer to the premaxilla than to the eye, widely separated; nostrils small, anterior near the stem, posterior on the top of the sac. Mouth large, four fifths as wide as the disk, oblique, lower jaws much longer and exposing the lower teeth. Teeth rather small, unequal, depressible on the jaws; in two series on the premaxilla, outer series of smaller teeth and twice as long as the inner; those of the lower jaws very unequal, in irregular series, inner teeth larger, largest near the symphysis one fourth as long as the orbit; a single erect tooth at each side of the vomer; a short series of four to six or more teeth on the forward ends of the palatines. Eye large, prominent, length little more than the distance from the mouth, or little less than the width of the interorbital area. Gills three; gill openings as large as the eye, transverse, below the pectorals, at the hinder edge of the disk. Pseudobranchiæ well developed. Two pyloric appendages. Bones hard and firm. Humeral process strong, with three spines, the anterior one of which is erect, and the posterior two of which diverge at the end of the bone, one pointing outward, the other inward. On the sharp ridge between the humeral spine and the head there is a shorter spine at each side. Of the four short opercular spines two are at the edge of the disk, the posterior directed outward, the anterior forward, the third and fourth are superior, one of them on the edge of the preopercle and the other between it and the hindmost of the four. Two short spines stand behind the angle of the mouth; a pair of strong ones stand outside of each nasal peduncle; and a single one is seen above the hinder part of each orbit. Besides those mentioned there are half a dozen behind the orbits on the skull; ventral surface spineless.

Foremost dorsal spine slightly forward of a line joining the narial peduncles, slender, rigid, reaching to the hinder end of the interorbital space, with a fleshy bait on the forward side, near the end, half or more than half as long as the spine itself. This spine has a very peculiar structure; near the end it forks somewhat like a boathook, one part passing directly onward with a slight bend at the end, where it is round and black, the other branch leaves the main stem near the end and goes forward in the body of the bait to support a pair of hard round black bodies like the eyes of a crustacean. The bait is long and slender of moderate width and hangs down in front of the mouth in function, when the staff is inclined forward; no doubt it is capable of great contortions and with the luminous balls near the ends of the staff must bear a striking resemblance to a living prey. The second spine is close behind the first and about equal to it in length; it is simple, filamentary toward the end, and bears a number of filaments along the stem. The third spine is longer than the second; it rises from the crown a short distance backward of the interorbital area. Between the humeral spines behind the third dorsal spine there is a group of three shorter ones, not reaching the second dorsal fin and apparently not connected by membranes, but toward their bases surrounded by a dermal mass. All fins fringed; origin of second dorsal midway from eye to base of caudal, base four fifths as long as the caudal fin; caudal narrow, subtruncate, less than three times as long as the orbit; pectorals broad, two thirds as wide as long, broadly rounded on the margin, length equal to distance from mouth to hind edge of eye; anal origin below fourth ray of second dorsal; ventrals small, rounded at the ends, one and one half times the length of the orbit.

Skin moderately tough, smooth, with scattered filaments, with dermal flaps below the edges of the disk and at the sides of the tail each bearing several filaments; lower surfaces smooth.

Clouded brownish on the upper surface, whitish beneath; filaments blackish; fins darkening to blackish outward, pure white on the fringes; caudal blackish, with a transverse series of about six white spots behind the middle.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Gn. M.

CERATIIDÆ.

Dolopichthys gen. n.

Degenerate pediculates adapted to a life in the mud and ooze at great depths in the ocean, having the fins more or less concealed in the skin and imperfectly suited to free progression off the bottom, and capturing the prey by means of an illicium, a modification of the anterior dorsal spine.

Form short, compressed, tapering from the occiput both forward and backward. Head large, subquadrangular in trans-section; skull with spines; forehead a longitudinal trough, concave transversely; snout broad, blunt; mouth large, cleft anterior and lateral; teeth depressible, acicular, unequal, in a single series on intermaxillary and dentary; no palatine teeth; tongue well developed; eyes lateral. Illicium elongate, two jointed. Three gills, none on the first arch; gill openings moderate, below the pectorals. Six branchiostegal rays. Skin naked, loose, soft. Fins small, more or less hidden in the skin; no ventrals. No caruncles. No pyloric appendages. No air bladder.

Some of the features to be relied upon in separating this genus from its nearest now known allies are the presence of cephalic spines and of a two jointed illicium, and the absence of dermal armature and of caruncles. If the illicium is excepted, the rudimentary condition of the fins is such as would place the typical species lower in the scale than any of the others of its nearer allies with which we are at present acquainted. The habits are no doubt similar to those of the related species. The texture of the skin alone is sufficient to fix the type as an inhabitant of muddy areas, and the fins are better adapted for propulsion through soft mud and ooze than for swimming freely through the water.

Dolopichthys allector sp. n.

Plates XIII., XIV., XV.

Br. r. 6; D. 1+6; A. 6; V. 0; P. 20; C. 9; Vert. 19.

General shape short and compressed, in depth more than one-third of the entire length, in width less than two-thirds of the depth. Body tapering from the head; body cavity three-fifths of the total length; caudal region narrow, deep. Head large, half of the length from snout to base of caudal, subquadrangular with sharp angles in trans-section, rather wide but less deep forward; crown wide, a transversely concave longitudinal trough from snout to nape; sides vertical, to concave about the mouth. Snout half as long as the head, broadly rounded across the end, concave between the nostrils, with a maxillary spine (or process) in front of each intermaxillary below the nostrils; chin longer, with a prominent symphyseal angle. Mouth large, cleft reaching about to a vertical from the front of the orbit, rising little forward, upper border formed by the premaxillæ; mandible half as long as the head. Teeth small, depressible, acicular, unequal, numerous, in single series on intermaxillaries and dentaries, longer on the lower jaws. A short series of four pharyngeal teeth on each side. Eye small, lateral, in the upper one-third of the height and behind the mid length of the head. Gills three, arches long, lamellæ short, no gill on the first arch, Plate XV., fig. 1; gill openings of moderate width, vertical, below the carpal joints. Branchiostegal rays six, Plate XV., fig. 2. A prominent sharp spinelike angle below the articular; a second below and at the inner side of the first; a third, the post-orbital spine, on the top of the head, prominent and sharp, at the end of the frontal ridge. Skin lax, thin, investing the fins well toward the extremities of the rays, without scales or asperities of any kind.

Illicium (first dorsal spine, Plates XIII., XIV.) suprarostral, length nearly three-fourths of that of the entire fish, reaching the base of the caudal, in two subequal sections, besides a basal portion applied to the top of the skull in the bottom of the trough and reaching backward to the eyes, outer section with a fleshy bulb on which is a wormlike process at the distal end. Possibly there are two or more processes on the bait (esca). Lower articulation of the illicium between the nostrils, distant from the end of the snout about three diameters of the eye or less than half the distance between the spines on the snout. The proximal half of the staff is somewhat enlarged by the muscles that move the distal joint and the esca. This last is a short rather wide black fleshy bulb with a white process toward the outer end, Plate XIII., fig. 5–7; though appearing deep black at the sides the esca dilates or spreads out in function disclosing a whitish probably luminous median portion which on front and back displays a couple of eyelike spots. The esca evidently simulates the appearance of certain prey, as in case of *Lophiomus caulinaris,* and is movable to some extent on the end of the rod while the process is most likely subject to lively contortion.

Both dorsal and anal are hardly visible externally; only the ends of some of the rays and of those of the caudal protrude beyond the skin, Plate XIII., fig. 1; but on removal of the skin, Plate XIV., fig. 1–2, this is seen to be a degenerate condition, the dorsal and anal being well developed, each having six (excepting the illicium) simple rays, the first of them unsegmented, Plate XV., fig. 3. Dorsal origin half way from the orbit to the end of the caudal; anal origin below the second ray of the dorsal, hindmost rays of both anal and dorsal reaching the bases of the caudal rays; depth of caudal three-fourths of its length, fin blunt pointed; pectorals small, short, broad, one and one-half times as long as wide, somewhat pointed, rays inserted toward the upper side of the carpals which latter are as long as the fin and widen backward, Plate XIV., fig. 2. No traces of the ventrals.

Stomach large, without pyloric cæca; intestine short. The two sides of the viscera are figured on Plate XV., figs. 5–6. No air bladder. Specimen described two and seven-eighths inches in length.

Deep black over the entire surface and on the linings of the body cavity. The only departure from an intense black is made in the esca of the illicium (Plate XIII., Fig. 5–7) which is white (probably luminous in life) in the upper portion and in the peculiar figure on the edge of the lower half.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3371	5° 26′ 20″ N.	86° 55′ W.	770 fathoms	39° F.	Glob. oz.

ANTENNARIIDÆ.

Chaunax coloratus sp. n.

Plates C., XVI., XVII., and Plate LXXIII. figs. 1 and 2, Lat. Syst.

Br. r. 6; D. 1 + 1 + 1 + 12; A. 5; V. 6; P. 14; C. 9; Vert. 19 (20).

High, thick, and massive at the nape and shoulders, tapering to slender toward the caudal fin; depth at the nape half the length to the base of the caudal; width in the temporal region nearly three fourths of the depth, narrower toward the throat; depth of caudal pedicel at its narrowest less than one fifth of the depth of the body. Length of head less than half of the total, greatest depth one and one third times the width; forehead and chin steep; sides almost vertical, concave below the orbit, with a prominent angle below the articular on a vertical from the front edge of the eye and slightly in front of the hind edge of the maxilla. Snout massive, short, steep below the chin and on the forehead, broadly rounded across the end, with a concave naked indentation, in which the illicium rests, reaching up through the interorbital region. Nasal sacs as large as the eye, equally distant from the front edge of the maxillary, the eye, and the illicium; anterior nostril subtubular, the hind edge being much higher; posterior nostril much the larger, close to the orbit. Illicium (first dorsal spine) little forward of the nasal sacs, twice as long as the eye, with a single free joint, the upper end of which swings forward in front of the mouth, and with a basal piece slightly mobile applied to the top of the skull (Plate XVI., fig. 1, Plate XVII., fig. 2), and also with an esca that is a fleshy bulb covered with short filaments, on the front side of the upper end of the staff. The illicial niche has the shape of an elongate horse-shoe, and receives the entire rod and bait when the latter are at rest (Plate XVII., fig. 1); its cavity is lined with naked skin, and its margins are surrounded by small spines. Mouth wide, rising steeply forward; maxillary extending backward to a vertical from the forward edge of the eye, toothless, not entering the border of the mouth, moderately widened and rounded at the end. The great process below the articular is nearly vertical and forms an angle with the jaw that is somewhat greater than a right angle; the process approaches its fellow of the opposite side of the head below the throat; it does not extend forward, as in *Chaunax Nuttingii* Garm., which indicates one of the most prominent differences between the two forms. Labial folds not crossing the symphyseal one-third of the united lengths of the mandibles. Tongue large, thick, broad, rounded, toothless, with scattered small papillæ. Teeth small, subconical (Plate XVI., figs. 3 and 4), in villiform bands on the jaws, and in two short transverse bands, separated by a space of equal length on the vomer. Eye medium, lateral, length nearly half of either interorbital width or length of snout. Gills two and one half, lamellæ short; rakers short rounded spinule covered tubercles, ten on the first arch; gill openings as wide as the eye, above the axilla, ear-shaped, valvular (Plate XVI., fig. 2); no gill on the first arch. Viscera figured on Plate XVII., fig. 7. No pyloric appendages. Skin very thin and loose. Vent below the gill opening, about two lengths of the eye forward of the anal fin. A small but prominent genital papilla.

Scales rather separated, bases broad, convex and disk-like, cusps acicular, erect and prominent (Plate XVI., figs. 5–8). In most cases each scale has but a single cusp; on many there is more than one, notably along the lateral line and on the head, where there are two to eight spines on a single base; this polyspinous condition is a frequent result of coalescence of the bases of a number of distinct scales. Lateral system distinct, in distribution similar to that of *C. Nuttingii* and of *C. pictus* Lowe. The disks lie transversely in the canals, each upon a single flat elliptical or oblong scale, as in Lampogrammus and others, and as in that genus, each disk is spindle-shaped, pointed at each end, and has a rounded central body. The canals of the system are indicated by bare areas among the scales; one from the upper end of each maxillary passes back on the forehead, bending outward behind each eye, and thence going backward above the gill opening and turning down behind it the line extends along the lower half of the caudal region to the base of the caudal fin; another passes back from the symphysis below each mandible, united to its fellow by a line across the chin, and is continued above the pectoral; a third runs from each side of the base of the illicium above each maxillary, going back along the side of each cheek, parallel to the mandibular branch, toward a branch from the aural region connecting the upper and the lowest line. A pair of spines on the cradle-like scale, one at each side of the channel, protects each disk, and between the tubercles immediately over the disk there are fleshy lobes and filaments. The channels do not present such a continuous appearance as is seen on *C. Nuttingii*, but appear more as if made up of a lot of isolated pieces of a channel.

Behind the illicium there is another rod lying upon the base of the first, and entirely hidden by the skin, and at the occiput there is another in similar condition (Plate XVI., fig. 1, and Plate XVII., figs. 2 and 4). The same conditions are found to obtain on *C. Nuttingii* and *C. pictus*, indicating the likelihood that these rudimentary concealed spines are generic characteristics. Fin rays protruding beyond the fin membranes. Second dorsal large, broadly curved in the upper outline, anterior ray short; hindmost two rays bound together. Anal small, not quite reaching the base of the caudal, originating below the ninth ray of the soft dorsal; base ending below the end of that of the soft dorsal. Pectorals strong, rounded, low on the sides, carpal elements as long as the rayed portion (Plate XVI., fig. 1, Plate XVII., fig. 6), lower element longer than the upper and paddle-shaped, the fin being placed on the upper edge of the end of the lower bone, and reaching to the middle of the entire length of the anal. Ventrals small, narrower toward their bases, apparently four-rayed, but actually possessing two rays in rudimentary condition, bound to the outer pair.

Color of the fresh specimen a deep rose, tinted with blue to blackish around the angles of the mouth and on the orbit around the eye (Plate C.). Color of alcoholic specimens uniform whitish externally and in the mouth; abdominal cavity lined with black.

Total length of the described individual ten and one-half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3363	5° 43′ N.	85° 50′ W.	978 fathoms	37.5° F.	Wh. glob. oz.

ONCOCEPHALIDÆ.

Oncocephalus porrectus sp. n.

Br. r. 6; D. 3–4; A. 4; V. 6; P. 14; C. 9.

Similar in shape to *O. vespertilio* Linn., but with longer rostrum and different coloration. The blotch at each side of the forward end of the vertebral column on the back is dark and commonly has a lighter centre, whereas on Linné's species the blotch is made up of a number of rounded light edged closely placed blackish spots. The rostral prolongation is much shorter than that of *O. longirostris* C. V.; in fact it forms an intermediate between that species and *O. vespertilio*, in this respect.

Disk subtriangular, in width equal to the length of the head or three times the depth; sides inclined, deepest at the head; caudal region subtriangular in cross section, flattened on the lower surface, with a blunt dermal keel at each edge, rounded across the top, tapering from the disk but narrowing more abruptly a short distance forward of the caudal fin. Skull from end of snout to nape half as long as the disk; forehead flattened, or slightly concave between the orbits. Rostrum acute, strong, round in a transverse section, in length equal to the width of the skull, deeply excavated on the lower side for the lodgment of the protractile illicium. Illicial bulbs higher than wide, the two lateral rounded, the median (upper) triangular and pointed at the top, all moved forward and downward when in function. Possibly the bulbs in this species, and in most other Halieutoids, are invisible when withdrawn to the niche and presenting their front aspects, but in function are turned out and down to bring into view their hinder surfaces. From the recess there is a groove down and forward, narrowing toward the jaws, to bring the illicium in front of the mouth. Mouth medium, distant from the rostrum about the width of the orbit, a little farther forward than the illicial niche, obliquely rising forward. Teeth in villiform bands on jaws, vomer, palatines, and tongue. Eye lateral, of medium size; orbit little more than half as long as the snout, two thirds of the width of the interorbital space. Nostrils small, close together, between the orbit and the forward end of the upper jaw; anterior porelike, posterior larger, oblong, oblique. Gills two and one half, no gill on the first arch; rakers represented by low rather wide prominences, of which there are four on the first arch; gill openings small, placed superiorly in the axilla. Vent little backward of the middle of the entire length.

Skin above and below thickly mailed by minute closely set stellate based tubercles amongst which on the upper surface there are scattered large tubercles the swollen trunks of which are harsh with small short spines arranged more or less regularly in radiating series. A series of the large tubercles passes from each side of the top of the snout along each side of the head and the median vertebral line to the caudal. Besides the upper two series there are three others at each side of the tail. Three series appear along each lateral edge of the disk, and also a number of scattered tubercles are seen between the dorsal and the lateral series. The largest tubercles are a pair, one of which stands in front of each eye; there is a smaller one above each orbit, and there are two between the orbit and the nape on each side. All of the tubercles have short stout cusps, with the general firmness and harshness of armature, the most serviceable in a rocky habitat. Lateral system indistinct on the top of the disk, less so on the sides of the tail, in a shallow groove below the front and the lateral edges of the disk. In many cases the papillæ are entirely covered by a bridge formed by juxtaposition of the apices of the two protecting spines. Filamentary fringes not greatly developed on the line; larger ones are scattered below the chin and along the carinæ of the tail.

Olivaceous, more or less clouded on the back, white on the lower surface; a darker blotch on each side near the foremost vertebræ, most often lighter in the centre; an ill defined streak of brownish passing back above the gill openings on the sides of the tail; fins blackish toward the ends, excepting the ventrals; a light band with brown at each side from each eye toward the corners of the mouth; iris with radiating bars of brown. Young with lighter backs and blacker fins, white around the mouth, with a white blotch opposite the interoperculum on the margin and another near the hind end of the subopercle.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 fathoms	58.4° F.	Rocky.

Zalieutes elater.

Malthe elater Jord. and Gilb., 1882, Proc. U. S. Mus., 365.
Zalieutes elater Jord. and Everm., 1896, Rep. U. S. Fish Comm., 511.

Br. r. 6; D. 5–4; A. 4; V. 6; P. 13 (12–14); C. 9.

Head and body much depressed, together forming a broad subtriangular disk, wider backward, from which the narrow and somewhat depressed tail tapers to the caudal fin. Length of head about two thirds of the width, greatest depth through the orbits less than one third of the width. Snout subtruncate, concave on the top, hardly extending beyond the mouth, deeply excavated for the rostral illicium, tip directed forward, subconical, with a pair of small erect tubercles immediately behind the tip, and a large tubercle directed outward in front of each eye. Illicium protractile, stem and bulb both capable of forward and downward movement; esca (bulb) large, fleshy, subtriangular, apparently without lateral lobes; basal portion of the bulb large and thick, and commonly with five papillæ on the lower edge, the third papilla being median; apical portion smaller, thin at the edges, which fold backward, surmounted by a small bifid or simple worm-like process. Mouth small, width less than length of orbit, and more than twice the width of the interorbital space. Teeth in villiform bands on jaws, tongue, vomer, palatines, and pharyngeals; palatine groups rounded, much smaller than the vomerine. Eye large, nearly three times as long as the snout, lateral; orbits prominent. Forehead slightly concave. Nasal sacs small; anterior nostril smaller than the posterior, with a short tube. Gills two and one half, no gill on the first arch; rakers obsolete; openings small, placed superiorly in the axilla.

Skin covered with fine closely placed sharp striate based tubercular scales, among which larger tubercles are scattered with more or less irregularity. A series of the larger tubercles may be traced from each orbit at the side of the median line of the back to the caudal; at each side of the tail there are several series, as also along the lateral edges of the disk, where they are larger and somewhat depressed, becoming larger and bi- or tricuspid posteriorly on the subopercle. Fin rays rough toward their bases. Lateral system distinct, arranged as in Oncocephalus, Halieutæa, and allies, but of a low grade of development. The fringes at each side of the sensory papillæ are elongate, but not particularly numerous. Tail flat on the lower side, subcarinate at the edges.

Fins small; dorsal origin midway from the orbits to the end of the caudal; anal origin about one length of the orbit backward from that of the dorsal, fin longer, hardly two thirds as long as the caudal; caudal narrow, rounded on the hind margin, length equal to that of the skull from snout to nape; pectorals shorter than the caudal, fringed; ventrals narrow, fringed, two thirds as long as the pectorals.

Brownish above; with numerous small irregular spots of brown, smaller on pectorals and caudals; an oblong ocellate spot of black, with yellow centre and pale edgings, nearly as large as the orbit, behind the nape at each side of the spinal column; white below. On some large specimens the smaller spots tend to disappear in a nearly uniform olivaceous brown on the upper surface, but the elliptical ocellus remains distinct.

Originally the type described was from Mazatlan, Mexico.

In essential features this species agrees so closely with the short snouted species of Oncocephalus that it is difficult to find characters for subgeneric distinction, to say nothing of generic separation.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. g. sh.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56	62.6° F.	Fne. gy. s. g.

HALIEUTOPSIS gen. n.

Outlines resembling those of Halieutæa. Rostrum and skull raised above the balance of the disklike head. Head like that of Halieutæa, wide and broadly rounded forward; subopercular region much swollen; snout indented. Eyes small. Rostral niche deep; rostrum overhanging; illicium protractile and depressible, esca with two large spherical lateral bulbs and a median slender elongate bifurcated more mobile portion. Mouth medium, anterior, overhung by the swollen margins. Teeth absent from vomer, palatines, and apparently from the tongue. Subopercular process and spines well developed. Gills two, none on first and fourth arches.

Type *H. tumifrons.*

In the diagnosis of Halieutæa, C. V., 1837, Hist. Poiss., XII., 457, Valenciennes does not mention the number of gills in the type species, *H. stellata* Wahl, 1797. Günther, 1861, Cat., III., 205, had a number of specimens and on dissection found "gills two and a half, the anterior arcus branchialis not having any laminæ." Goode and Bean, 1896, also Jordan and Evermann, 1898, concur in attributing two and a half gills to the genus. It is evident that the dibranchiate species described herewith, though closely allied must be provided for elsewhere than in the genus founded by Cuvier, whence the reason for the existence of Halieutopsis. At various times Alcock has described species of Halieutæa from the Andaman Sea and the Bay of Bengal; as he does not indicate the number of gills, it may be that some of them belong to the dibranchiates.

Halieutopsis tumifrons sp. n.

Plate XXV.

Br. r. 6; D. 6–5; A. 4; V. 6: P. 14; C. 9.

Halieutopsis tumifrons is more slender, longer in the caudal portion, has a smaller eye, and has the dorsal situated farther from the disk than is the case with *Halieutæa stellata* Wahl. The outlines of disk are subcircular, indented at the snout, and the edges on the suboperculum and forward are considerably swollen, especially so below the eyes. Body and head united in a much depressed subcircular or subquadrangular disk, of less than half of the entire length, as broad as long, notched in front of the mouth, with less curvature at the sides, deepest below the orbits and gradually lessening in depth backward, thick and rounded on the edge from the mouth to the subopercular process, and grooved from the suborbital region backward to the middle of the disk. Head higher at the snout, slightly concave in front of the interorbital space, flattened backward, with a deep indentation below the rostrum at the jaws. Snout prominent, but not extending farther forward than the edges of the disk above the angles of the mouth, bluntly rounded in front, deeply excavated below the rostrum to permit retraction of the trilobed protractile illicium between the orbits, and with a wide deep rounded groove in front of the illicial niche to favor motion forward and downward and protrusion directly in front of the mouth. Illicium of medium size, possessed of greater freedom of movement than in most allied species, bearing two large lateral spherical bulbs between which rises an erect narrow thin leaflike third one that is notched at the top in a couple of wormlike prolongations, Plate XXV., Fig. 4. The arrangement of the spines around the cavity is such as to compel the attention of the prey to the escal bulbs from the front, rather than the sides; the bulbs themselves, as in other species, are capable of movement forward and down so as to expose the hinder surfaces. Nasal sacs prominent, facing obliquely upward; nostrils small, anterior minute. Mouth comparatively small, width one third of that of the disk; lower jaws longer. Teeth in villiform bands on jaws and tongue, absent from vomer and palatines. Eyes small, orbit little more than the length of the snout. Interorbital space wide, width twice the length of the orbit, equal to the depth of the swollen margins of the disk opposite the eyes. Gills two, none on the first and fourth arches; rakers, somewhat pointed small fleshy tubercles, five on the first arch, four on the second; gill openings small, placed superiorly, well forward and toward the side of the tail, in the axillæ. Scales harsh, strong, firmly set, radiate-based tubercles, acicular to bicuspid on the central portions of the back, bicuspid to tricuspid or multicuspid around the outer margins of the head, absent from the ventral surfaces except around the edges. At the borders the tubercles are joined together and to the marginal bones, thus contributing materially to the tumid condition of those localities; the spines at the sides and the front of the rostrum are strong; those at the sides of the tail are commonly bicuspid; the concave space of the top of the snout is naked or covered only by the spreading bases of the spines at the edges. Subopercular process short and thick, in the specimen described having four spines, in others five or six. Lateral line distinct along the sides of the tail, deeply channeled around the edges of the disk; of the five sensory papillæ below each mandible the second is placed immediately in front of the space between the first and the third. The fleshy lobes and their fringes over each papilla, between the protecting spines, are feebly developed. Tail distinct, round, moderately strong at the disk, tapering little in the anterior two thirds of the length, thence becoming small more rapidly to the caudal fin. Carpals almost entirely included in the disk. Fins small; dorsal origin midway from snout to end of caudal, base hardly longer than the orbit; anal origin very little backward of hind end of base of dorsal, Plate XXV., Fig. 5; caudal about as long as skull from snout to nape, slightly convex on hind margin; pectorals moderately broad, shorter than the caudal, fringed; ventrals short, fringed, length one fourth of the width of the disk.

Color brownish white, muscular portions light flesh color; the entire body evidently brilliant in life with some variety of red.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 6′ W.	1360 fathoms	36° F.	Glob. Oz. dk. Sp.
3400	0° 36′ S.	86° 46 W.	1322 "	36° F.	Lt. gy. glob. Oz.

Dibranchus hystrix sp. n.

Plate XXIII.

Br. r. 6; D. 6; A. 4; P. 13; C. 9.

Though in a measure resembling *Dibranchus atlanticus* Pet. in outlines, the present species has more of the characteristics of pediculates from great depths in its skin, armature and skeleton; the skin and the tubercles are smoother and the latter are farther apart, longer, and offer less resistance to the touch. Body and head together form a much depressed disk in which the depth is about equal to one third of its length, to two fifths of its width, to the postorbital width of the skull proper, or to two thirds of the distance from snout to nape. The form narrows anteriorly and, when in ordinary position, the disk appears more elongate than that of *D. atlanticus;* it certainly is longer than wide. Tail narrow, round, tapering from the vent. Skull highest at the nape, descending forward to the concavity on the snout whence there is an abrupt rise; transversely almost flat on the crown, at the sides toward the disk the descent is somewhat rapid. Snout prominent, extending beyond the mouth, deeply excavated between the nostrils for the illicium, deeply notched above the nasal sacs, concave on the top, with a prominent tricuspid backward-hooking tubercle above the tip. Illicium protractile, trilobate; median lobe largest and capable of bending forward and down as if the hinder side was that presented as a lure and in consequence of the structure invisible when the esca is retracted into the subrostral recess and not in function. This view is favored by black pigment on the front faces of the lobes on many specimens, and by the traces of brilliant colors on the hinder surfaces. Nasal sacs surrounded by ridges; nostrils small, anterior with a short tube, posterior transverse and larger. Eye large, as long as the snout; length less than the interorbital width. Crown slightly convex; interorbital space wide, concave, width equal to one and two thirds times the length of the snout. Mouth large, width equal to more than the distance across the orbits, more than one third of the width of the head, or contained one and one half times in the distance from snout to nape. Teeth in villiform bands on jaws and tongue, absent from vomer and palatines. Two gills, none on first arch; rakers short, rounded, tubercular, four on the first arch and five in front of the second; apertures medium, placed superiorly in the axillæ. Subopercular tubercle strong, bent inward, bearing five spines, end tricuspid, one of the terminal cusps extending forward, one upward, and the longest one backward. Skin soft, thin; bones less firm than those of *D. atlanticus.* Tubercles mostly simple with long slender cusps and spreading striate bases, not closely placed, mixed with comparatively few small scales. As if to aid in locomotion some of the tubercles along the lower side of the edge of the disk are two to three cusped. Spinules such as appear on the bases of the tubercles on other species are not present. The strongest tubercles are in two series on the top of the tail, and in those at the sides of the disk. Small spines are loosely scattered over the ventral surface, and a few are seen on the tops of the orbits. The erect spines around the edge of the rostrum are comparatively large. Lateral line distinct, with deep channels, agreeing with the other species of the genus in regard to the forward position of the second papilla from the symphysis of the lower jaws, in the dermal flaps, and in the protecting spines at the sides of the papillæ.

Fins small; dorsal origin midway from occiput to base of caudal, or midway from front of orbit to end of caudal; anal small, slender, origin the length of the maxilla farther backward than the origin of the dorsal; caudal narrow, length about four fifths of the distance from snout to occiput, hind margin rounded; pectorals rounded, fringed, shorter than the caudal; ventrals narrow, about as long as the maxilla.

Color a rich dark chestnut to chocolate brown; fins black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3375	2° 34′ N.	82° 29′ W.	1201 fathoms	36.6° F.	Gy. glob. Oz.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 "	36.8° F.	Gn. M. S. rky.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 "	36.4° F.	Hard.

Dibranchus scaber sp. n.

Plate XXIV.

Br. r. 6; D. 6; A. 4; V. 6; P. 13; C. 9.

This species resembles *Dibranchus hystrix*, Pl. XXIII., more than any other of the known species of the genus, yet the differences are so marked as to render it an easy matter to distinguish the one from the other. *D. scaber* has more uniform, smaller sized, shorter cusped, and more numerous tubercles on the back, the rostrum is shorter and the notches are not so deeply incised above the nostrils, and the spines on its extremity are differently arranged, and the snout and the anteorbital space are broader. Body and head depressed, together forming a disk nearly as wide and one third as deep as long, narrower forward. Head as wide as long, slightly convex behind the eyes on the crown, concave forward; interorbital width nearly twice the length of the snout. Tail narrow, round, slender, tapering. Snout short, two thirds as long as the orbit, blunt, extending little forward of the lower jaw; rostrum broad, concave on the top with a strong ridge around the upper edge, separated from the supranarial prominence by a shallow notch from which a groove extends backward, excavated below in a recess for the trilobed protractile illicium. Nostrils small; anterior smaller with a short tube; posterior transversely oblong. Eye large, orbital length and width of interorbital space equal. Mouth hardly as wide as that of *Dibranchus hystrix*, oblique, width equal to three fifths of the distance from snout to nape. Teeth in villiform bands on jaws and tongue, absent from vomer and palatines. Two gills, none on the first arch; rakers very short, thick, blunt, six on the first arch and the same number on the front edge of the second; openings medium, situated superiorly in the axillæ, near the hind edge of the disk. Subopercular tubercle with four spines, the compressed hinder portion of the tubercle having only two, the anterior one of which is directed inward and very little forward and the posterior one backward and very little outward. This process makes a ready mark of distinction from *D. hystrix* or any other species of the genus. The skin is more firm than that of *D. hystrix* and the bones are more rigid. The tubercles on the skin are rather small, close together, and have short cusps and spreading striate bases; those of the tail are larger, as also those at the edges of the disk where, along the operculum, some have two cusps, others three. Large tubercles occur at each side above the middle of the orbit and above its hind margin, also above the nasal sacs and in a series of five at the outer edge of the rostrum the median (anterior) one of which is three cusped. On the ventral surface the spines are very small and not in contact. A considerable number of small spines occur on the orbit. Lateral line distinct, deeply channeled; second papilla at each side of the symphysis of the lower jaws situated in front of the space between the first and the third. Fringes on the fleshy lobes between the spines at each side of each papilla of the lateral line feebly developed.

Fins small; dorsal origin midway from snout to end of tail, fin two thirds as long as the distance from snout to nape; anal origin to end of snout equal to twice the distance from the first ray of the dorsal to the base of the caudal; caudal narrow, in length equal to twice the interorbital width of the head, rounded on the hind margin; pectorals shorter than the caudal, fringed; ventrals fringed, nearly one third as long as the head, narrow.

Greyish black, apparently reddish or purplish in life, fins blackish; lower surface darker. A five-inch specimen described.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3431	23° 59′ N.	108° 40′ W.	995 fathoms	37° F.	Lt. br. M. glob.
3364	5° 30′ N.	86° 8′ 30″ W.	902 "	38° F.	Yl. glob. Oz.

Dibranchus asper sp. n.

Br. r. 6; D. 6; A. 4; V. 6; P. 14; C. 9.

Though in the main this species resembles *Dibranchus scaber*, Plate XXIV., there is a number of features in which it does not agree with that species. The rostrum is shorter, and hardly extends forward of the lower jaw; the tubercle on the tip of the snout bends upward and curves backward; the concavity on the top of the snout is deeper; and the subopercular tubercle is more nearly longitudinal, *i.e.*, it does not bend inward at the end so as to bring the compressed extremity with its pair of spines parallel with the backbone, but one of the spines points toward the gill opening, the other directly outward. In *D. scaber* the rostrum is longer and extends forward of the lower jaws, the rostral tubercle is straight and protrudes almost horizontally, the concavity on the top of the snout is not so deep, and the subopercular tubercle is bent inward so that the blade-like end extends one of its spines toward the head and the other backward. There is a considerable amount of individual variation in the number of spines on each tubercle; this aside, however, the tubercles are of much assistance in the determination of the species of this genus and of allied genera.

Width of disk equal to the distance from the snout to the gill openings, that is, a little less than twice the length from snout to nape. Crown flattened. Snout short, with a deep naked cavity on the top, hardly protruding beyond the lower jaws, with a series of five erect tubercles around the outer edge, with a strong antrorse tubercle above the inner edge of each nasal sac, subrostral area deeply excavated for the trilobed protractile illicium, rostrum separated by a very shallow notch from the preorbital ridge. Eyes large, length equal to the width of the interorbital space, longer than the snout, orbits convergent forward. Mouth medium, width about four fifths of the distance from snout to nape. Teeth in villiform bands on jaws and tongue, absent from palatines and vomer. Gills two, absent from first and fourth arches; openings small, placed superiorly in the axillæ. Branchiostegal rays six, outer stronger and joined to the opercular bones. Subopercular tubercles strong, with four spines; the anterior pair on the stem, one of them directed obliquely outward and somewhat upward, the other out and downward; the terminal pair bladelike, one of them directed outward, the other in toward the gill opening. Spines tubercular, strong, unequal, with sharp cusps and broad striate bases, largest on the top and the sides of the tail and along the edges of the disk where some have two spines and others three, very small and more separated on the lower surfaces.

Fins small; dorsal origin behind the midlength of the disk; anal origin little backward of the end of the base of the dorsal, fin reaching backward of the bases of the caudal rays; caudal nearly as long as the skull to the nape, somewhat pointed; pectorals medium, less than twice as long as the ventrals, fringed.

Blackish externally and on the linings of the body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418;	16° 33′ N.;	99° 52′ 30″ W.;	660 fathoms;	39° F.;	Br. S. bk. Sp.

DIBRANCHOPSIS gen. n.

A Dibranchoid in which the skeleton has degenerated to become semicartilaginous, in which the subopercular process and spines and those of the rostral angle are obsolescent or obsolete, obsolescent in young, obsolete in old, and in which the forehead and rostrum are much depressed and flattened. Shape and spines similar to those of Dibranchus, but the armature less harsh. Orbit large; eye medium. Mouth wide; tongue broad, naked anteriorly. Occiput high. Gills two, none on first and fourth arches. Illicium small, protractile forward and down; lateral lobes of esca (bait) rather small, functioning in position as at rest; median lobe large, broad, high, rounded, and with a small sensory papilla on the middle of the upper edge, turning downward in function so as to expose the hinder surface.

The typical species of this genus, *D. spongiosa* Gilb., 1890, is recklessly referred by Jordan and Evermann to the genus Halieutæa. They "might just as well have placed it at random under any other genus of a totally different fauna."

Dibranchopsis spongiosa.

Halieutæa spongiosa Gilbert, 1890, P. U. S. Mus., 124.

Plate XX.

Br. r. 6; D. 6; A. 4; V. 5; P. 13; C. 9.

Head and body depressed, together forming a subquadrangular or subpentangular disk nearly or quite as broad as long. Disk truncate in front, descending from the skull backward and sideways, curved on the margins at the sides and converging on those opposed to and behind the gill openings backward from the process of the suboperculum. The entire body is soft and flabby. There is some resemblance in shape to *D. micropus* Alc., but the disk is broader and hardly so deep, the spines are less developed, the dorsal is a little farther from the gill openings, and the caudal section is as long as the disk or longer. Body translucent, extending little farther backward than the gill openings, thin in the opercular region. Head large, one third as deep as long; skull half as long as the distance from snout to dorsal, broad and flat behind the orbits, broad, flattened, descending and widening forward on the forehead and snout, width at nostrils more than length of snout and orbit. Rostrum truncate to indented on large individuals, more pointed and prominent on small ones. Snout three times as broad across the nostrils as long, as deep as long, subtruncate, margin indented above the illicium, which is lodged in a wide but low excavation between the nostrils. Nasal sacs prominent; posterior nostril larger, transverse, anterior with a short bell-shaped tube. Illicium small, trilobate, protractile, upper lobe capable of being thrown forward and down in front of the mouth. Mouth large, width two thirds of the length of the skull, slightly ascending forward, jaws strongly curved laterally, articular prominence little backward of a vertical from the hind margin of the eye; lower jaws longer, prominent in front of the rostrum. Teeth on jaws and tongue in broad villiform bands; a pair of round groups of pharyngeal teeth, smaller than the eye, on each side; no teeth on vomer or palatines. Orbit large; eye rather small, shorter than the snout, half as wide as the interorbital space. Gills two, none on the first and fourth arches; rakers short rounded tubercles, six on the first arch, seven on the second; gill openings as large as the eye or larger, placed superiorly in the axillæ. Branchiostegal rays six, outer one larger, extending to the hinder edge of the disk, joined to the suboperculum. Opercles broad; suboperculum rounded at the outer angle of the disk, process hardly noticeable on large specimens, but more prominent and bearing four to six spines on young individuals. Stomach siphonal, intestine short, no pyloric cæca. Spines of medium size, moderately rough, unequal, not close together, simple over the upper and the lower surfaces of disk and tail, two to three cusped along the edges anteriorly, smaller below, stronger in two or more series on the tail, small, and in two to three series on the top of the orbit. Lateral line distinct, fringes above the papillæ between the spines at the sides of the line comparatively feeble.

Dorsal origin on large specimens above the hindmost extremity of the disk, but, owing to less extent of disk, farther back on small ones; base of fin shorter than the eye, greatest length two thirds of the length of the skull; anal very narrow, nearly as long as the dorsal, originating backward of the base of the latter one length of the orbit; pectorals slender, as long as the caudal, fringed, hinder rays short; ventrals narrow, three fifths as long as the skull, fringed, foremost rays shorter; caudal narrow, five sixths as long as the skull to the nape, hind margin convex.

A specimen with the length of two and one fourth inches, having a prominent subopercular tubercle and a pointed rostrum, is apparently uniform blackish; one four and one fourth inches long is blackish below the disk, black with white tips on the fins, brownish on the vertebral region and the tail, and brownish white over the disk; and one six inches in length is whiter over the whole body, probably having been some shade of red in life.

The differences between young and old in this species indicate that the species has been derived from one with a pointed snout and larger tubercles. The appearance is that of a more degenerate form than any of those in the collection from much greater depths.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3417	16° 32′ N.	99° 48′ W.	493 fathoms	40.6° F.	Gn. M.
3418	16° 33′ N.	99° 52′ 30″ W.	660 "	39° F.	Br. S. bk. Sp.
3425	21° 19′ N.	106° 24′ W.	680 "	39° F.	Gn. M. and S.

Originally described from

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
2992;	18° 17′ 30″ N.;	114° 43′ 15″ W.;	460 fathoms;	41.8° F.;	Bk. S. R.

Dibranchichthys gen. n.

Head and body depressed, together forming a broad rounded disk; caudal region distinct, slender, tapering. Rostrum excavated below in a recess lodging a trilobed protractile illicium. Nostrils and mouth anterior; latter transverse, oblique. Teeth absent from the vomer, present in villiform groups or bands on palatines, jaws, and tongue. Eyes large, with horizontal outlook. Gills two, none on first and fourth arches; gill openings small, placed superiorly in the axillæ; no pseudobranchiæ. Fins small, of few rays; anal narrow, backward of the dorsal. Skin above and beneath covered with unequal broad based spines or tubercles.

In a general way this type is similar to Halieutæa and especially so to Dibranchus or Malthopsis. The discovery of this form is suggestive of a possible degradation of a number of closely allied genera to the rank of subgenera in a revision of the family.

Dibranchichthys nudivomer sp. n.

Br. r. 6; D. 6; A. 4; V. 5; P. 13; C. 9.

In the regularity of its outlines this species approaches *Malthopsis erinacea;* it is easily distinguished by being more oblong, having a shorter rostrum, and by the weakness of the subopercular tubercle besides the more important feature, the absence of vomerine teeth. Body and head greatly depressed, together forming a disk in which the length or the width of the head is about seven eighths of the length of the body; tail elongate, narrow, round, tapering from the vent. Crown slightly arched. Snout short, blunt, concave on the top, with a low ridge forward from the orbit and a more prominent one above each nasal sac; rostrum short, not produced forward of the mouth, rounded in front, with a shallow groove at each side separating it from the nasal ridges; excavated above the mouth to lodge the medium-sized trilobate protractile illicium. Middle lobe of tentacle largest, with vertical ridges, and a small papilla on its upper and backward surface. In addition to the direct protractile and retractile motion of the rostral illicium there is, when it is protruded, a considerable motion downward by which, with the motion of the middle lobe forward and down to present its hinder surface to the front, the bait is brought immediately in front of the mouth. Nostrils small; posterior larger, transverse; anterior with a short tube. Mouth medium, nearly equal in width to half the distance from the snout to the nape; lower jaws longer. Teeth in villiform bands on the jaws and the tongue and in short oblong groups on the forward ends of the palatines, absent from the vomer. Orbits large, oblong, convergent anteriorly, length one and two thirds times that of the snout or one and one fourth times the width of the interorbital space.

Gills two, none on the first and the fourth arches; five rakers on the first arch, six on the second; openings small, placed superiorly in the axillæ. Subopercular tubercle feebly developed, with six or seven spines, not very prominent. Scales rough, tubercular, those of the middle of the disk somewhat apart, with slender cusps and spreading striate bases on which there may be one to several spinules; scales of the ventral surface small, simple; those of the edges of the disk larger, closely placed, three or more cusped, in several series; those of the tail large, three or four series with larger cusps; those of the top of the snout with several spinules; and those on the orbits very small. A few small spines on the rays of the caudal.

Lateral line distinct, with deep channels, in which the small rounded glands or sense organs are hidden by fleshy lobes with hardly perceptible fringes and each protected by a spine at each edge of the canal; second gland from the symphysis on the lower jaw forward of the space between the first and the third.

Fins small; dorsal origin in the middle of the total length; anal origin backward of the base of the dorsal half the length of the orbit, fin slender, pointed, two thirds as long as the caudal; caudal nearly as long as the distance from snout to nape, rounded on the hind margin; pectorals three fourths of the length of the caudal, fringed, rounded on the outer margin; ventrals, small, narrow, fringed.

Dark brown to black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3395	7° 30′ 36″ N.	78° 39′ W.	730 "	38.5° F.	Rky.

Malthopsis sparsa sp. n.

Plate XVIII.

Br. r. 6; D. 5–6; A. 4; V. 5; P. 13; C. 9.

If this form is compared with *Dibranchus atlanticus* Pet. it will not only be seen that there is a certain degree of resemblance, but that the present species is narrower and less angular on the head, and has much finer tubercles and a much smaller subopercular process. Body and head forming together a much depressed subcircular disk about as wide as long; tail distinct, narrow, rounded, tapering from the vent. Greatest depth of the head nearly one third of its greatest width, top moderately prominent above the balance of the disk but not angular except around the edge at the top of the snout; length of the head to the gill openings less than one length of the orbit shorter than the distance from the snout to the vent. Snout short, lower jaws longer, top slightly concave with erect tubercles around the edge, deeply excavated below the rostrum for the club-shaped, trilobed, protractile illicium. The movement of this organ as a whole is forward and back, but the fleshy esca can be thrown forward at the top somewhat like the tongue of a frog. The lateral lobes of the esca are rounded; the median lobe is slightly notched, the notch being due in part to a folding inward of the edges of the bulb. Nasal sacs anterior, prominent, near the illicium, directly forward of the eyes; nostrils small, close together, posterior subcrescentic, anterior smaller with a short bell-shaped tube. A prominent tubercle above each angle of the mouth. Mouth medium, anteriorly somewhat turned upward; maxillary about as long as the orbit. Tongue broad, rounded, with a broad villiform band of teeth. Teeth in villiform bands on jaws and tongue, and in three short broad closely placed patches on the vomer and palatines. Eyes medium; orbits converging forward, in length one sixth of the width of the disk, twice the length of the snout, one and one half times the width of the interorbital space, covered with finer scales than those of the surrounding parts of the head. Gills two, none on the first arch; rakers six on each of the first two arches, short, thick, rounded; gill openings smaller than the pupil, little forward of the vent, placed superiorly in the axillæ. Branchiostegal rays six, all resting against the ceratohyal, outer one much larger and stronger, firmly joined to the lower side of the outer edge of the suboperculum. Operculum narrow anteriorly, much broadened backward; suboperculum broad, with a feebly developed four to six spined tubercle at the angle of the disk. Skin of the upper surface covered with unequal, closely set, sharp cusped, broad based tubercles, with radiating ridges on the bases, larger and bearing two or more cusps along the edge of the disk, yet larger along the middle of the back and in somewhat regular series on the tail, elsewhere more closely set and surrounded by smaller narrow based slender spines. The radiating ridges of many scales bear very small cusps. Scales of the ventral surface fine and sharp. The lateral line is easily traced by the rounded sensory papillæ, of which there are about a dozen in the series from the snout over the eye and the back to the side of the tail. At each side of each papilla there is a spine and a fleshy lobe, more or less fringed, by which it is protected and hidden; on the lower side of the disk the line forms a deep channel crossed by bridges over the papillæ. The second papilla at each side of the chin is in front of the space between the first and third.

Dorsal origin about midway from snout to end of caudal, base hardly as long as the orbit, greatest length nearly the width of the mouth; anal narrow, shorter than the dorsal and originating little backward of its hindmost ray; caudal as long as the skull, slightly convex on the hind margin; pectorals as long as the caudal, fringed; ventrals narrow, fringed, length equal to width of mouth.

Fresh specimens brownish, more or less gray, with rather faint and ill defined spots of light brown somewhat closely placed over the disk; or in cases with white vermiculations in the brown, or in others with whitish spots over a brownish surface; ventral surface uniform light; orbits darker.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 09′ 45″ N.	80° 50′ W.	322 fathoms	46° F.	Gn. M.
3385	7° 32′ 36″ N.	79° 16′ W.	286 “	5.9° F.	Gn. M.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 “	48° F.	Fne. gy. S.
3396	7° 32′ N.	78° 36′ 30″ W.	259 “	47.4° F.	Hd. gy. M. and S.

Malthopsis erinacea sp. n.

Plate XIX.

Br. r. 6; D. 5–6; A. 4; P. 12–13; C. 9.

Compared with *Malthopsis sparsa,* Plate XVIII., this species has the disk broader and more rounded opposite the eyes, the snout overhangs the mouth more, is more pointed and extends forward instead of up, and there is a lack of the small slender spines amongst the broad striate-based tubercles. Body and head broad, much depressed, together forming a disk in which the opercles extend back along the sides of the body so that the vent is only about one length of the orbit farther back than the sides of the head, and in which, as viewed from above, the anterior and lateral outlines form more than half of an ellipse. Depth of disk three and one half times in its length, or three times in that of the head. Snout moderate, little longer than the lower jaws, the tip having the appearance of a single multispinous tubercle directed forward and but slightly upward, with a pair of strong tubercles at each side above the space between the eye and the nostril, deeply excavated below the rostrum for the large trilobed protractile illicium. Behind the top the upper lobe of the esca has the appearance of being folded from each side to form a chamber from which a small fleshy point protrudes above the top of the lobe. The illicial esca in the species is one of the largest in the genus. Nasal sacs small, anterior; nostrils close together, in front of the eye, posterior larger, anterior with a short tube. Mouth rather small, oblique, not as wide as the distance across the orbits and the space between them. Teeth numerous, in villiform bands on jaws, vomer, palatines, tongue, and pharyngeals; vomerine and palatine groups somewhat separated, the former broader and shorter. Cheeks concave and grooved below the eyes. Crown flat, a concavity above the snout. Orbits little longer than the snout. length equal to the width of the interorbital space, convergent forward, Subopercular process comparatively small, with four to six spines. Gills two, none on the first and fourth arches; rakers small, blunt, rounded, six on each of first and second arches; gill openings small, placed superiorly in the axilla, on a line joining the ends of the subopercular tubercles. Spines of the disk and tail harsh, tubercular, the larger with swollen bases, numerous striæ and many spinules; some of those along the sides of the disk trifid; those of the tail in six to eight series; a row of strong ones from the snout to the postfrontal region; those on the ventral surface and the fins smaller and more uniform; and those on the orbits very small. Lateral line similar to that of *M. sparsa,* Plate XVIII., but with less development of the fringes between the spines over the papillæ; channels around the edges of the disk deeply excavated; second papilla at each side of the symphysis of the lower jaws in advance of the space between the first and the third; thread connecting the papillæ distinct as in the Brotuloids and others. Vent halfway from the eye to the base of the caudal.

Dorsal origin behind the middle of the length from snout to end of the tail, greatest length of fin five sevenths of that of the caudal; anal origin about the length of its base behind the base of the dorsal; caudal narrow, as long as the skull, subtruncate; pectorals narrow, fringed, as long as the caudal; ventrals narrow, two thirds as long as the pectorals, fringed.

Brownish, with traces indicating a rose color in life; young individuals blackish; fins blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 fathoms	42.3° F.	R. glob. oz.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Gn. S.
3418	16° 33′ N.	99° 52′ 30″ W.	660 "	39° F.	Br. S. bk. Sp.
3425	21° 19′ N.	106° 24′ W.	680 "	39° F.	Gn. M. and S.

Malthopsis spinosa sp. n.

Plate XXII.

Br. r. 6; D. 6; A. 4; V. 5; P. 13; C. 9.

Nearly allied to *Malthopsis erinacea,* Plate XIX., but less broadly rounded in the anterior half of the disk, with carpalia more completely included in the disk, with much smaller and much more numerous spines, and with less development of the subopercular process. Body and head depressed, together forming a slightly oblong disk in which the head is as long as wide, or seven eighths of the length of head and body, narrower in the anterior half; tail elongate, narrow, rounded, tapering from the vent. The disk extends on the carpals to the bases of the pectoral rays; edges of the disk not as much swollen as in *M. erinacea;* subopercular angle very blunt, process short. Snout little longer than the lower jaw, length equal to width of interorbital space, or to two fifths of the length of the orbit, protruding, pointed, turned upward at the end, concave across the top, deeply excavated below the rostrum for the illicium. Illicium large, with three lobes, the median of which is largest, less round, vertically ridged, and is thin edged around a cavity immediately behind its tip. The organ can be protracted to bring the bulbs in front of the mouth, and the median bulb can be turned forward and down, a movement accompanied by changes of shape, producing the effect of a living and swimming bait, an effect probably enhanced by luminosity. A groove on each side separates the rostral and post-narial ridges; the latter are most prominent near the angle of the mouth. Supraorbital ridges prominent, crown little arched. Nasal sacs prominent; posterior nostril large, transverse; anterior nostril small, bell-shaped. Mouth oblique, rather narrow, equal in width to half the distance from the snout to the occiput; lower jaws very little longer. Teeth in villiform bands on jaws, vomer, palatines and tongue; vomerine band wide and short; palatine groups longer, rounded. Orbit large, one and two thirds times the length of the snout; eye longer than high. Gills two, none on first and fourth arches; gill openings small, placed superiorly in the axillæ; rakers six on each of the first two arches. Branchiostegal rays six, slender, outer stronger and joined to the opercular bones. Opercular tubercle small, with four spines or sometimes more.

Dorsal small, behind the middle of the total length; anal small, narrow, originating about one length of the eye backward from the base of the dorsal; pectorals short, about three fifths of the length of the skull from the occiput to the end of the snout, longer than the anal, moderately broad, fringed; ventrals small, fringed, length half of that from snout to nape; caudal small, subtruncate, nearly one fourth shorter than the skull in front of the vertebral column.

Scales much smaller and much more numerous than those of *M. erinacea*, commonly simple, single cusped, striate based. A few have two cusps each, and those on the top of the snout and about the nasal sacs and on the orbital ridges are multispinous. On the larger scales of the sides of the tail the cusps are longer, more slender and hooked; those on the ventral surface are small.

Lateral system with deep channels and distinct disks (papillæ), and with but a feeble development of the fringes between the spines on the lobes covering the sensory organs. The arrangement of the papillæ resembles that obtaining throughout this genus and in allied genera; the second at each side of the symphysis of the lower jaws is immediately forward of the space between the first and the third.

Uniform dark brown; fins black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard.
3393	7° 15′ N.	79° 36′ W.	1020 “	36.8° F.	Gn. M.

Malthopsis spinulosa sp. n.

Plate XXI., XXVI.

Br. r. 6; D. 5–6; A. 4; V. 5; P. 12–13; C. 9.

Any idea of a close relationship with *M. sparsa,* Plate XVIII., that might be suggested by similarity in the outlines of the present type is dissipated on comparison of the coloration, the spines and the subopercular tubercle; the tubercle is obsolescent, the spines are very fine, and give the surface more of a velvety appearance, and the colors have more of the characteristics of those of great depths. Though taken from depths of 200 to 300 fathoms, the colors of *M. sparsa* were in great degree suggestive of the influence of sunlight. Body and head much depressed, together forming a subcircular disk, with blunted corners at each side of the snout and opposite each subopercle; length of body from snout to vent about one length of the eye more than that of the head. Length of skull nearly half and depth of head one third of the width of the disk; crown slightly convex from the internarial region to the nape; interorbital region little concave transversely. Snout short, shorter at the top, excavated between the nasal sacs for the trilobed, protractile illicium; chin longer. Median lobe of esca larger, foliaceous toward the upper edge, with a slender prolongation at the top and a median groove on the back, movable forward and down when in function; recess apparently lined with luminous tissue; lateral lobes smaller, rounder, in some of the specimens at hand highly tinted with a different color from that of the median lobe. Nasal sacs prominent; posterior nostril large, transverse; anterior much smaller, round, with a short, bell-shaped tube. Anterior edge of rostrum in most cases slightly turned upward. Mouth of moderate width, oblique, wider than the interorbital space; lower jaws longer. Teeth in villiform bands on the jaws, in large closely placed groups on the vomer and the palatines, and in a broad band twice as long as wide on the tongue; pharyngeal groups small, rounded, see Plate XXVI., Fig. 4 to 7. Eye one third of the length from snout to nape, equal to the width of the interorbital space, longer than the snout. Margins of the disk hardly to be described as swollen. Subopercular tubercle weak, small, four to six spined on small specimens, almost imperceptible on larger ones. Gills two; rakers short, round, five to six on first and second arches; gill openings small, placed superiorly in the axillæ, backward of the subopercular angle. Branchiostegal rays six, slender, outer one stronger and joined to the opercular bones. Scales tubercular, comparatively small, close together, with slender cusps and striated spreading bases; commonly larger and hooked in several rows at each side of the tail, at each side of the papillæ of the lateral line, and along the edges of the disk. A larger, more prominent spine at the end of the rostrum, another behind each eye, a pair near the middle of each eye on the interorbital space, and another pair immediately behind the nasal sac. Spines of the lower surfaces smaller. Lateral line distinct, deeply excavated around the edge of the disk. In Fig. 2 of Plate XXI. the second papilla at each side of the symphysis below the mouth is not indicated; it lies forward of the space between the first and the third of the series. The fringes on the lobes at the sides of the papillæ do not appear to be either numerous or greatly developed. The caudal section of the male is apparently longer than that of the female.

Dorsal originating close to the middle of the total length, midway from the occiput to the base of the caudal; anal origin one length of the eye farther back than base of dorsal, fin length equal that of the latter, two thirds as long as the caudal, pointed; caudal narrow, as long as the skull, rounded on the hind margin; pectorals medium, fringed, rounded on the outer margin, short in the hinder rays; ventrals small, fringed, narrow, little shorter than the pectorals.

Translucent whitish to brown, with or without cloudings or spots, Fig. 1, Plate XXI. Traces of brilliant red colors appear on light colored individuals and on some the lateral lobes of the illicium are deep red, while the median lobe is of cream color; the illicium varies from light color to dark brown.

Specimen drawn five and one half inches in length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.

COTTOIDS.

The only Cottoids secured by the expedition are shoal water forms. For the greater part the group is made up of species living on the bottom, yet through their activity and abundance of fin surface they appear to have maintained their places on the upper levels. Though nearly coincident with the Discoboles in horizontal distribution, compared with them very few indeed belong to the deep sea. The seasonal migrations of the Cottoids have a considerable range vertically; many species descend a hundred and fifty fathoms or more and thus intrude themselves into the list of fishes habitually dwelling below the hundred fathom level. The greatest depth given for a member of the group is that of *Cottunculus inermis,* taken by the Steamer "Ingolf" at nine hundred and fifty-seven fathoms, off the north-eastern coasts of Iceland, and *Cottunculus Thomsoni* is close upon this with a depth of nine hundred and twelve. An approach toward these is that of *Cottus bathybius,* secured by the "Challenger," south of Yedo, Japan, in five hundred and sixty-five fathoms. A fair idea of the representation below a hundred fathoms may be obtained from the list of species.

TRIGLOIDS.

Several species belonging to this group appear in the collection. One or two of the new ones, *Peristedium barbiger* and *P. crustosum* are somewhat questionable additions to the number of deep sea species, though taken at various depths between fifty-six and a hundred and eighty-two fathoms. *Agonus decagonus,* as taken in the "Ingolf" collections, is from the greatest depth as yet noted for the group, seven hundred and twenty nine fathoms, off the northern coasts of Iceland. *Peristedium Rivers-Andersoni* Alc., was obtained by the "Investigator" off Colombo, Ceylon, in depths of one hundred and forty two to four hundred fathoms.

TRIGLIDÆ.

Prionotus frontalis sp. n.

Br. r. 7; D. XI, 11; A. 11; V. 6; P. 12 + 3; Ll. 103, scales; Ltr. 8 + 20.

Form less elongate, head more prominent in the orbital region, groove between the orbits narrower and deeper, and the lateral bones of the snout less produced than in *Prionotus miles* Jen. Body comparatively short and stout, tapering rapidly from the skull, depth nearly one fourth of the entire length; vent midway from the front of the orbit to the base of the caudal.

Head one third of the total length, two thirds as wide as long, as wide as deep, widest behind the mouth, narrow at the crown, high and arched from the front of the orbit to the nape. Snout moderately broad, subtruncate, nearly straight on the top, arched transversely, one and three fifths times as long as the orbit, narrowing forward, with denticulations at the sides, above the maxillary, and with a comb-like series of eight larger denticles in front of the nostrils at each side of the symphysis. Nostrils small; posterior a longitudinal slit, midway from the eye to the end of the snout; anterior subtubular with a fold reaching to the posterior nostril. Mouth wide, horizontal; maxillary reaching a vertical from the front edge of the eye. Teeth in villiform bands on jaws, vomer, and palatines; palatine bands about three times as long as wide. Orbits prominent above the crown, one fourth as long as the head. Interorbital space a narrow trough, the width of which is half the length of the orbit, half as wide as long, bounded posteriorly by a transverse groove that is bent backward in the middle. Head plates with radiating finely granulate ridges. A short spine above the forward part of the orbit on the orbital ridge; a larger one above the hinder portion of the orbit; a low spine-like prominence at each side of the occiput, and another on the suprascapular; opercular and subopercular spines strong and sharp, coracoid spine shorter; two to three tubercular prominences immediately behind the eye. Scales small, harsh, ctenoid, absent from the space on the nape between the suprascapulæ, and at each side of the base of the first dorsal. Lateral line with fifty-two pores.

Anterior spine of first dorsal half as long as the head, nearly equal to length of fin base; forward edges of first two or three spines rough with denticles or granulations; first ray of second dorsal similarly roughened. Anal originating below origin of second dorsal but base and fin extending nearer to the caudal than in the latter. Caudal length equal to greatest length of second dorsal, three fifths as long as the head, fin concave on the hind margin. Pectoral rather narrow, pointed, longest ray four fifths of the length of the head. Fifth ventral ray three fifths as long as the head; first ray short, spinelike. Ends of rays in all the fins more or less exserted.

Four pyloric appendages. Females of the length of four inches contain well developed eggs.

Back grayish brown, more or less freckled with brown, with brownish streaks extending from the middle of the back forward and down to the lateral line and with others from the line down and backward to the white (red) of the lower portion of the entire body. A darkish spot below the eye on the cheek. Lower ends of the oblique streaks on the flanks darker; upper portion, as also the basal parts, of the dorsals darker. Or these fins may be described as similar to those of *P. miles* in having a lighter longitudinal area in the middle. Upper twelve rays of the pectorals darker, lighter toward the ends. Caudal reddish with blackish upper edge and with two transverse lunate bands of blackish. Ventrals white.

This species is separated from *P. miles* by the postocular tubercles, the shortness of head and body, and other features; from *P. birostratus* it is distinguished by a larger first dorsal, etc., from *P. quiescens* by a larger number of scales, by the postorbital groove, and the scaleless area in front of the dorsal, from *P. albirostris* by a straighter profile, and the postorbital groove, from *P. xenisma* by the larger first dorsal, the naked space behind the occiput, and by absence of papillæ on the throat, and from *P. gymnostethus* by the squamation of the breast, etc.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 fathoms	62.6° F.	Fne. gy. S. G.

PERISTEDIIDÆ.

Peristedium barbiger sp. n.

Br. r. 7; D. VIII, 18–19; A. 18–19; V. 6; P. 12 + 2; Ll. 33; Ltr. 4.

Body moderately elongate, depressed, slender behind the body cavity. Head massive, tapering to narrow from the orbits, more than one third as long as the distance from snout to end of caudal, twice as long as deep, three fourths as wide as long; width of crown equal to length of orbit or to width across ends of rostral processes; suborbital keel prominent from the rostrum backward widest in a blunt angle opposite the hind border of the eye; a less prominent keel on the suboperculum, sharper backward. No smaller angle between the suborbital and the subopercular, as appears on *P. crustosum*. A slight prominence on the suborbital keel opposite the forward half of the eye. Snout depressed, broad, concave longitudinally, arched transversely, more than half as long as the head; rostral processes as long as the orbit, separated at the mouth by about one third of the orbital length, converging forward, depressed, blade-like, wider than the space between them, denticulate on the edges, rounded and bearing several larger denticles on the ends, top of each basal portion with a large backward inclined spine from which a low keel extends to the orbit, each process with three outlets of the lateral system on the lower side anterior to the mouth and a fourth opposite the maxillary; a hooked spine near the inner side of each nostril and a sharp spine at each outer edge forward of a slight prominence nearly opposite the nostrils. Mouth wide, lower jaws much shorter; maxillary extending two thirds of the distance from the bases of the rostral prolongations to the eye. Chin barbels numerous, closely bunched, comparatively long, the groups of the two sides hardly separated below the isthmus, outer barbel with about twenty barblets, reaching a vertical from the middle of the eye. Eye large, equal in length to the rostral processes, or to the width of the interorbital space, one fifth of the entire length of the head, prominent. Interorbital space concave transversely, ending at a spine of moderate prominence above the hinder edge of each orbit. Back of head depressed, slightly concave, with a low ridge at each side on which behind the postorbital spine there is a low spine or prominence and another at the end on the back of the head. No ridge or prominence behind the orbit on the side of the head. A short opercular spine from which a ridge extends forward. Subopercular spine hardly longer than the opercular. A very low keel starts below the middle of the snout at the edge, and continues back toward the ventral fin. Gill openings moderate; lamellæ short; rakers five plus sixteen, short, clubshaped. Pseudobranchiæ small. Head-shields all granular, an obsolescent spine above the forward part of each eye. Scales rough, granular, in four series on each side, wider than long, each with a sharp compressed and hooked spine, except on eight or nine of the hindmost in the second row from the middle of the back in which the spine is compressed into a blade at each end of which there is a cusp the anterior being antrorse the posterior retrorse. Abdominal plates enlarged, each with a low keel in which there is a spine of more or less prominence. Genital papilla medium.

Fins medium to small; first dorsal rather low, longest ray equal to post-orbital length of head; origin of second dorsal midway from end of snout to end of caudal, slightly in advance of the origin of the anal; caudal small, half as long as the snout, equal in length to first ray of first dorsal, posterior margin concave; pectorals broad, one and one fourth times as long as the orbit, rounded on the margins, upper of the two free rays the longer; ventrals comparatively large, rounded, hindmost ray united to the body by membrane for half or more of its length.

Red in life somewhat brownish on the back, with an oblong yellow (white) edged spot of deep black, covering the second to the sixth rays of the first dorsal, in the outer half of the fin. Second dorsal with brown spots toward the base on the rays and again toward the extremities, margin light. Pectoral dotted with brown. Caudal plain. Lower surfaces uniform light (red). On some the spots on the second dorsal are faint or obsolete and the back is not so brown.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 “	62.6° F.	Fne. gy. S. G.

Peristedium crustosum sp. n.

Plate A, fig. 2.

Br. r. 7; D. VIII, 17; A. 17–18; V. 6; P. 12 + 2; Ll. 32–31; Ltr. 4.

This species resembles *P. truncatum* Günt. somewhat in form, but is possessed of a longer lateral barbel, a longer subopercular spine, wider flanges and greater angles on the preopercular ridge, narrower rostral prolongations, and shorter second dorsal and anal. As in other species the body is massive forward and slender in the entire postabdominal section. Head narrower forward, low on the snout, high and abruptly prominent in the orbital region, nearly four times as wide across the opercular ridges as across the crown, depth half of the length or three fifths of the width. Snout broad and low, width at the front of the orbits three times, and that at the bases of the rostral prolongations twice the width of the interorbital space, length half of that of the head; either the length of the rostral processes or their distance apart equals the width of the interorbital space. Each rostral process is narrower toward its outer end, has four sensory membranes (lat. syst.) toward the outer edges of the lower sides, is denticulate on the edges, and has three or four stronger denticles in front of the end. Nostrils small, subtubular, apparently of much less importance in the system than the greatly developed sensory membranes in the openings of the lateral system or than the barbels of the chin. Immediately behind the superior processes of the upper jaws there is a transverse series of four papillæ and at each side of the same processes there are two more. Mouth wide; maxillary not reaching a vertical from the front of the orbit by about one third of the orbital length; lower jaws shorter. Chin with numerous barbels, separated by a considerable space below the symphysis; lateral barbel with about eight groups of barblets, extending backward of the eye to the pectorals or to the end of the suborbital keel. Eye large, prominent, half as long as the snout, one third of the length of the head, one and one third times the interorbital width. Interorbital space arched longitudinally, deeply concave transversely with strong ridges at the sides. Gill-rakers slender, sharp, three to five plus twenty-four, several rudimentary, longest one third as long as the orbit. Surfaces of the head harsh with fine granulations. Above the forward part of the eye on the ridge there is a group of two or more small sharp compressed hooked spines; behind the orbit the ridge rises in a stronger spine, and behind the latter a lower one, behind which there is another still lower. At each side of the occiput there is a strongly compressed spine, at the end of the ridge, bearing one to two cusps. On the top of the basal half of each rostral process there is an erect spine, and behind and inward from the nostrils there is a pair of similar ones. Above the angle of the mouth there are others standing on the serrated edge of the ridge, which latter expands backward across the opercles and supports a prominent angle opposite the forward edge of the eye, a more prominent one opposite the hinder part of the orbit and another at the end of the gill cover, the last one preceded by a small one in the indentation. Opercular spine, strong, sharp; suprascapular ridge low, rough. A serrated ridge immediately above the upper jaw is divided into two above the articular; a lower ridge starting behind the angle of the mouth forms three sections, of which the middle one is small. Scales rough, granular, wider than long, with strong compressed hooked blade-like spines, nine or ten of those in the second row on the back of the tail sending a cusp forward as also backward. The spines make four keel-like series the second of which forms a continuation of the lower postorbital keel, curving downward behind the head till on the level of the opercular spine, and the fourth of which continues the keels of the abdominal plates from the pectorals. Lower surface naked in advance of the pectorals, covered with large granular laterally ridged plates backward. A prominent genital papilla.

Body red in life, more or less vermilion, throat and abdomen whitish, upper half of the dorsal on the larger specimens black. On the young specimens from which fig. 2, Plate A, is drawn the rostral processes and the outer barbel are much shorter, the former only half as long, the latter reaching little if any behind the middle of the eye. In other respects the agreement is close.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 fathoms	55.8° F.	Gn. M.
3355	7° 12′ 20″ N.	80° 55′ W.	182 "	54.1° F.	Bk. g. sh.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 "	57.1° F.	Rocky.

DISCOBOLES.

From a partial examination of the collection it was shown, in "The Discoboli," 1892, p. 8, that the distribution of this group extended under the tropics on the sea bottom from the Arctic to the Antarctic Ocean. Since the material has been studied the evidence has proved to be even more conclusive than was supposed at that time. There are six new species in the lot, taken between two degrees and thirty degrees of north latitude, at depths of 511 to 1823 fathoms, and in temperatures varying from 35.8 to 41.8 degrees Fahrenheit. These low temperatures are suggestive of distribution quite to the neighborhood of the poles; they approximate so much to those given by Nansen and others in the farthest north that with the animal life known to inhabit the region the presumption would appear to be warranted. As yet Discoboles are unknown from the Indian Ocean and the Western Pacific; neither the "Challenger" nor the "Investigator" secured any. There is some likeness between the distribution of the Discoboles. to that of Cottus and its closer allies; whether this has any bearing on derivation is yet to be decided. It may be that the discovery of *Cottus bathybius* Günt. in the western Pacific is to be followed by knowledge of new Discoboles from the same parts of the world.

The species here described were all taken from tracts of soft mud and ooze on the bottom of the sea, locations in which ventral disks must be of little use to the fishes, and naturally the disks are more or less obsolete. On one of the species the disk is present but very small; on four of the others the disk has disappeared but more or less of the pelvis remains, see Plate XXVIII., fig. 2^a to 2^d and Plate XXIX. figs. 1, 2, and 3. On account of the presence of the pelvis, and of the amount of compression of the head and body the name *Merophorus angustifrons* has been given to one of the species. The pores connecting with the lateral system are large in all the present species; the system itself is confined to the head, as heretofore noted for the group. The eyes in all are comparatively large, adapted no doubt to phosphorescent light. There are no specially differentiated light producing organs, as in Sternoptychidæ, Stomiatidæ, Pediculates and others, though it may be the entire skin is phosphorescent.

LIPARIDIDÆ.

Careproctus longifilis.

Careproctus longifilis Garm., 1892, Discoboli, p. 9.

Plates XXVII. and XXVIII. fig. 1; Plate XXIX. fig. 5.

Br. r. 6; D. 54; A. 49; V. 6, supporting a disk; P. 13 + 4 + 4; C. 9.

Body and head forming a subspherical mass, short, broad, rounded on the top, the sides, and the front, somewhat flattened on the lower surface at the disk; caudal section from the vent backward narrow and slender. From the snout to the anal fin is hardly more than one fourth of the total length; the length of the body without tail or head is little if any more than half of the head's length. Head short, less than one fifth of the total, very convex on the crown, on the snout and on the cheeks, flattened at the throat, as wide as deep, high at the occiput, curving downward steeply on the forehead. Snout short, as long as the eye, deep and wide, very convex across the top, broadly rounded from side to side, produced very little forward of the mouth. Mouth large, horizontally cleft; lower jaw little shorter, included; maxillary reaching a vertical from the front edge of the eye. Eye medium, about as long as the snout, length nearly two fifths of the width of the interorbital space, size not far from that of the ventral disk. Teeth small, slender, subconical, acuminate, in villiform bands. Disk a trifle longer than wide, length equal to half the distance from the end of the snout, its distance from the vent hardly equal to its diameter. Gill openings narrow, as wide as the eye, above the base of the pectoral. Operculum small, hind angle a short spine, almost horizontal, slightly bent upward. Epicoracoid spine-like, strong, two thirds as long as the head, reaching far down on the flank, that is, below the level of the upper part of the pectoral, bent forward in the middle.

Vertical fins confluent, well developed; dorsal originating but little backward of the vent, above the axil of the pectoral, rising gradually toward the caudal; anal origin seven or eight rays farther from the head; both fins overlapping the caudal more than half of its length and connected with it by membrane; caudal elongate, half as long as the head, narrow, of nine rays, pointed. Pectoral width equal to three fourths of the length of the head, longest ray, at the upper edge of the fin, equal to two fifths of the total length of the specimen; fin in three portions, of which the upper contains thirteen rays, shortening from the uppermost, the middle contains four shorter widely separated rays, forming an interspace, and the lower, at the sides of the disk, contains four independent rays of which the third and fourth, provided with long filaments, are nearly three tenths of the total length of the specimen. The rays are more rigid than those of the species of Paraliparis in the collection; they end in very slender and flexible extremities.

Intense black, uniform over head, body, and fins.

Total length three and three fourths inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3374	2° 35′ N.	83° 53′ W.	1823 fathoms	36.4° F.	Green ooze

Paraliparis fimbriatus.

Paraliparis fimbriatus Garman, 1892, Discoboli, p. 9.

Plate D, fig. 3; Plate XXIX. fig. 1.

D. 49; A. 45; V. 0, a rudimentary pelvis; P. 24.

Greatly compressed behind the body chamber, depth one seventh of the total length. Head short, two elevenths of the total, five sixths as broad as long, flattened on the crown, broadly arched from nape to snout, steep on the sides. Nape broad but not high. Snout short, nearly as long as the eye, as seen from above broadly rounded in front, depth much less than the width. Mouth wide; maxillary reaching a vertical behind the orbit, lower jaws included. Teeth slender, in moderate numbers, simple, acuminate, in bands of several series. Eye medium, one fourth as long as the head, longer than the snout, length equal to two thirds of the interorbital space. Body chamber shorter than the head. Epicoracoid long and slender. Hinder angle of the operculum a strong sharp spine. Distance from the snout to the first ray of the dorsal fin four seventeenths of the total. First anal ray below the ninth ray of the dorsal. Vertical fins confluent. Caudal region narrow, deep; caudal fin acuminate. Pectoral broad, without a gap between upper and lower rays, but notched somewhat by the shorter fifth and sixth rays counting from beneath, each ray prolonged in a soft filament. Ventral disk obsolete, but pelvic bones remaining as a pair of thin elements behind the humeral symphysis, Plate XXIX., Fig. 1. These pelvic rudiments occupy a similar position but are closer together than those of *P. attenuatus.* In the ovary there are fourteen or fifteen eggs as large as the orbit, and among them numerous others much smaller, varying in size from that of a cabbage seed downward.

Purplish black anteriorly; shading to greyish near the mid caudal vertebræ and backward.

Four inches in total length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 fathoms	35.8° F.	Green mud

Paraliparis grandiceps sp.

Plate XXIX. figs. 4–4e.

D. ca. 56; A. ca. 42; P. 15, 1, 1, 1, 1, 5.

The specimen described is very badly preserved. Evidently the species bears considerable resemblance in form and proportions to *P. bathybius,* characterized by Collett from types secured in the northeastern Atlantic. Body and tail compressed, depth not far from one fifth of the total length. Caudal section thick, deep anteriorly and for some distance back from the body, then decreasing in depth rapidly and becoming thin and slender. Head as broad and deep as long, nearly one sixth of the total length, narrowed somewhat at the snout, subquadrangular in transsection across the orbits, flattened or slightly concave on the crown, swollen on the cheek. Snout blunt, longer than the orbit, a trifle overhanging the mouth. Mouth wide, maxillary extending below the entire orbit. Teeth small, short, robust, blunt, subconical, with broad bases, firmly attached, in one series on each jaw, larger toward the angles of the mouth. Orbit rather large, less than the length of the snout, less than one third of the length of the head. Origin of the dorsal distant from the head about half the length of the latter. Anal origin below the eighteenth ray of the dorsal. The outlines of dorsal and anal are in a measure like those of *Liparis Agassizii;* the longest rays occur near three fifths of the distance from snout to caudal, and are not less than two thirds as long as the head. Throughout the length these fins are rather wide. Pectorals wide, the entire width being equal to that of the skull across the parietals. In the upper and longer portion of the fin there are fifteen rays; this portion is separated by an interspace with four short rays, distant from one another, from the lower portion of the fin, which contains five rays nearly as long as those in the upper part. The shortest rays of the pectorals occupy a space the width of which is about equal to the length of the orbit; they are connected by membrane. The longest rays are nearly or quite as long as the longest of those of either dorsal or anal. Accurate determinations of the numbers of rays in the vertical fins, or of the shape and connections of the caudal are prevented by the condition of the specimen.

Total length ten inches or more.

Dark brown or black.

The structure of the pectoral most likely agreed with that figured for *P. bathybius* in the "Challenger" Report by Günther in having the low membrane between the sections of the fin, but with the addition of short rays in support, which may not have protruded beyond the edge, as in the figure given by Collett.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3434	25° 29′ 30″ N.	109° 48′ W.	1588 fathoms	36.4° F.	Br. m. bk. sp.

Paraliparis attenuatus sp. n.

Plates XXVII. and XXVIII. fig. 3; Plate XXIX. fig. 2.

Br. r. 6; D. 66; A. 57; V. 0, pelvis rudimentary; P. 17, 1, 1, 1, 4.

Total length equal to three and one fourth times the length of the body cavity. Body compressed, depth about one sixth of the total length; caudal section very long and slender. Head less than one seventh of the total, one fourth deeper than wide, high at the nape, curving downward in front in a broad arch, flattened or slightly convex on the crown and forehead, narrower and rounded and blunt on the snout; interorbital space little, if any, wider than the eye, narrowing rapidly in front. Snout somewhat produced above and forward of the mouth, hardly as long as the eye. Mouth medium, horizontal; maxillary not reaching a vertical from the hind border of the orbit. Teeth small, simple, short, acuminate, not numerous, in single series, stouter and broader toward the base than those of *P. fimbriatus.* Eye large, one and one third times the length of the snout, orbital length nearly equal to the width of the interorbital space. The skull is rather concave between the orbits because of the greater height of the bones around them. Epicoracoid long, slender, spine-like, more than half as long as the head, extending down and back in the flank so much that its lower end is nearly one length of the orbit behind the base of the pectoral.

Pectoral of about twenty-four rays divided by an interspace, containing three shorter and widely set rays, into a lower group of four and an upper group of seventeen rays. Apparently without a ventral disk, but with a rudimentary pelvis, Plate XXIX., fig. 2, in which the elements are less developed than in either *P. fimbriatus* or *P. latifrons.* Vertical fins confluent. First ray of the dorsal a very short distance backward of the base of the pectoral, near a vertical from the end of the opercle or the vent. Caudal narrow, acuminate. Anal origin eight or nine rays farther backward than that of the dorsal.

Uniform black, or lightening to brown in the posterior half; linings of the body cavity black.

Total length three inches or more.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3364	5° 30′ N.	86° 8′ 30″ W.	902 fathoms	38° F.	Yellow globigerina ooze

Paraliparis angustifrons sp. n.

Plates XXVII. and XXVIII. fig. 4; Plate XXIX. fig. 3.

D. 57; A. 53; V. 0, pelvis rudimentary; P. 37.

Body compressed, narrow, depth two elevenths of the total length, retaining depth to the mid length then tapering rapidly. Head narrow, short, six and one half times in the total length, nearly twice as high as wide; crown convex. Snout short, blunt, rounded, not as long as the orbit. Orbital length half of the interorbital width, more than one fourth of the length of the head. Mouth wide; cleft rising forward on a gradual incline; maxillary extending farther back than the orbit. Teeth subconical, hooked, small, in villiform bands of moderate width, series more numerous than in *P. latifrons.* At the base the teeth are abruptly broadened. Hind angle of operculum spine-like, elongate, directed downward. Epicoracoid moderately long and slender.

Vertical fins confluent; dorsal origin on the nape; anal origin about ten rays farther backward than that of the dorsal; both well developed;

caudal long, acuminate. The caudal section becomes very slender at some distance in front of the base of the fin. Pectorals broad without a gap at the bases of the rays, but with a notch in the lower half caused by shorter rays; ends of rays prolonged as filaments. No ventrals; dissection exposes a rudimentary pelvis immediately behind the humeral symphysis. These pelvic elements are short and deep, as shown on Plate XXIX., fig. 3.

Very likely the movements effected by the strong bands of muscle from the nape over the top of the head are those of rooting or grubbing with the snout; the soft filaments of the pectorals again indicate a probability that the field of operations was in mud or ooze where a ventral disk would be ineffectual. All things considered, it appears most probable that the species of Paraliparis dwell on the softest portions of the sea bottom; such a dwelling place will most reasonably explain the loss of the ventral disk.

Head and belly black; fins blackish; body over the muscular portions lighter, somewhat greyish.

Total length four and one half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dark green mud

Paraliparis latifrons sp. n.

Plates XXVII., XXVIII. figs. 2–2f.

Br. r. 6; D. 55; A. 47–49; V. 0, pelvis rudimentary; P. 18, 1, 1, 4 to 5.

Body much compressed, greatest depth near one fifth of the total length, tapering rapidly from the nape, where it descends somewhat abruptly, and becoming slender behind the middle of the length. Head comparatively large, nearly one sixth of the total length, deep at the occiput, high at the nape, broad and convex on the forehead, wide at and behind the eyes, one third longer than wide, sides vertical. Snout short, massive, very broad, thick, rounded, little produced beyond the mouth. Mouth large; maxillary reaching below the hind margin of the orbit. Teeth small, simple, acute, in villiform bands of few rows. Eye large, one and one half times as long as the snout, three tenths of the length of the head, one and one third times the width of the skull between the eyes. Bones of the head very thin and fragile; top of skull descending forward, nearly plane, but top of head rendered quite convex by the strong bands of muscle from the nape which extend forward upon the interorbital space. Operculum with a short rather weak down and backward-directed spine. Epicoracoid long, slender, extending down behind the base of the pectoral.

Vertical fins confluent. Dorsal origin above the base of the pectoral, slightly in advance of a vertical from the vent. No ventral disk; pelvis rudimentary, the basal elements of considerable size, Plate XXVIII., fig. 2^a.–2^f. No trace of a disk appears externally, the pelvis is only to be discovered by removal of the tissues close behind the humeral symphysis. Upper portion of the pectoral with about eighteen rays separated from the lower portion of four, rarely five, rays by an interspace of membrane supported by a couple of short rays, Plate XXVIII., fig. 2^a. Longest rays of the pectoral, in the upper portion, nearly as long as the head; the majority of the rays have filamentary prolongations; the four or five rays in the lower or anterior portion are only about half as long as the others. Eggs large, nearly as large as the eye.

Black on the sides and lower surface of the head, on the abdomen and the fins; remainder of the surface blackish to clouded brownish.

Total length five inches or more.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Green mud.

GOBIOIDS.

Judging from what is known of them at the present the Gobies do not lend themselves to the development of bathybial species as readily as less active forms in other groups. Only four species have been reported from depths greater than a hundred and fifty fathoms. The greatest depth is that assigned *Callionymus Agassizii* G. and B., 1888, at three hundred and forty fathoms, in the Gulf of Mexico. This species was identified by Goode and Bean for Agassiz's Three Cruises of the United States Coast and Geodetic Survey Steamer "Blake" and published under this name in Vol. II., p. 29, fig. 207; for reasons they do not mention it has been refigured and described by them under the name *Callionymus himantophorus* G. B., 1896, Oc. Ich., 296, Pl. LXXVI., fig. 268. The depth reported by Vaillant, 1888, for *Callionymus phaëton* Günt., taken by the steamer "Talisman" off the Azores, is three hundred and six fathoms; this author also notes a depth of two hundred and forty-three fathoms for *Gobius Lesueurii* Risso, off the European coasts. Species of these genera among the collections of the

"Investigator" from the northern parts of the Indian Ocean, are noted by Alcock at depths of more than a hundred fathoms. In the present "Albatross" collection there is a new species of Callionymus from between Malpelo Island and the Isthmus of Panama at a hundred and twelve to a hundred and twenty-seven fathoms. The slender claims of the group to a place on the lists of deep sea fishes rest entirely on the genera mentioned; the species mentioned show no special bathybial modifications.

GOBIIDÆ.

Callionymus atrilabiatus sp. n.

Br. r. 6 (6–5); D. IV, 9; A. 8; V. 6; P. 23; C. 12.

Form of moderate elongation, depressed, tapering from the operculum to the snout and to the caudal; body cavity less than half of the length to the base of the caudal. Head one third of the length to the base of the tail, two thirds as wide as long, hardly two thirds as deep as wide, broad and slightly convex across the parietal region, narrow and grooved between the eyes, narrow and blunt on the snout, with a low arch from snout to nape. Snout as long as the eye, wider than deep, subangular forward, rounded at the end. Nostril porelike, nearer to the eye than to the end of the snout. Mouth small; maxillary extending little, if any, behind a vertical from the front edge of the orbit. Teeth small, in short villiform bands which are widest near the symphyses and narrow rapidly backward. Eyes large, very prominent, close together; orbit as long as the snout, less than one third of the length of the head. Process of the preoperculum stout, turned upward at the end, bearing a strong upward directed spine and a stronger one directed forward. Gill openings small, superior, directly forward of the upper edge of the pectoral base. Four gills; rakers five to six, short, clubshaped. Pseudobranchiæ medium. Lateral line single; distinct, with very small, closely placed pores on the flanks and across the aural region at the nape; indistinct, and with scattered pores on the head.

Dorsal originating opposite the middle of the space between the base of the pectoral and the gill opening, at one third of the distance from the snout to the base of the caudal, first ray longest. Second dorsal higher forward, pointed behind, hindmost rays longest, reaching the bases of the caudal rays. Anal fringed, origin below the third or the fourth ray of the second dorsal, hindmost rays forming an acute angle which reaches the caudal fin. Pectorals broad, appearing as if obliquely truncate in the upper half of the fin, longest rays below the median, reaching the anal. Ventrals large, broad, reaching the anal, fringed, pointed, fourth ray longest. Caudal nearly as long as the head, of ten long rays and two short ones, longest in the middle.

Above the middle of the flanks brownish with numerous closely placed transverse streaks of brown, which anteriorly and on the head are broken into small spots, or which in places become vermiculations; dorsals, pectorals and caudal with small spots of brown and whitish, forming series on the rays; first dorsal with a larger spot, which may have been bluish surrounded with light color, in the outer half of the fin between the third and the fourth rays. In some cases the fins appear to be thickly freckled with brown and with white. Anal white, with a long band of black near the lower edge; fringes white. There are indications that the light colors were red to yellowish in life. Lower surfaces white below body and head, yellowish backward. Upper lips deep black; sometimes the black of the sides unites in front, in other cases it is confined to the sides of the mouth. Orbits black in the upper and white in the lower and greater portion.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3378	3° 58′ 20″ N.	81° 36′ W.	112 fathoms.	55.9° F.	Broken shells.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fine grey sand.

BLENNIOIDS.

The Blennioids represented in the collection are very young ones, taken by the townet, of which the adults probably do not belong with the deep sea fishes. The group enters the bathybial lists through the works of Ström, Collett, Günther and others, who assign depths of a hundred and fifty fathoms or more to species of Anarrhichas and Chirolophis.

BLENNIIDÆ.

Entomacrodus cruentatus sp. n.

Plate L′, Fig. 1.

D. 12 + 15; A. 15; V. 3 (4); P. 12; Vert. 34.

Moderately elongate, compressed, depth three seventeenths of the total length. Head narrow, three fourteenths of the length from snout to end of caudal; crown arched, interorbital space sharply convex, apparently without a crest, tentacles, or filaments. Snout somewhat pointed, as long as the eye. Eye large, three tenths of the head. Mouth small, maxillary not reaching to the middle of the eye. Teeth anterior, cusps acicular; a larger, hooked canine behind the series at each side on the lower jaws, and in front of this another smaller and more slender one; upper teeth similar to the lower ones, but with a single smaller canine at the end of the series near the angle of the mouth.

Dorsals continuous; the contiguous ends marked by a notch; first spine above the upper angle of the gill opening, above the axil of the ventrals. First anal spine below the ninth spine of the dorsal. Pectorals broadly rounded. Externally the ventrals appear to have only three rays, but dissection uncovers a rudimentary fourth. Caudal subtruncate. Skin smooth; lateral line on the body indistinct.

Color above the abdominal cavity very light brownish yellow. Whitish to translucent on the flanks and the sides of the head; belly silvery. A large spot of red on the middle of the pectorals; upper lip red; two or three narrow blotches of red across the nape, and a transverse streak of the same color interrupted in the middle at the bases of the caudal rays. There are groups of brown puncticulations on the caudal pedicel in front of the red streaks. Fins light, with a little more of brownish toward their bases.

Total length thirteen sixteenths of an inch.

Taken in the townet off the Cocos Islands.

TRACHYPTERIDÆ — POMACENTRIDÆ.

Neither Trachypteridæ, Lophotidæ, Fistulariidæ, Centriscidæ nor Pomacentridæ, of various groups not introduced here, are to be found in the material on which this report is made. The genera Trachypterus, Stylophorus, Regalecus, and Lophotes as noted in the "Challenger" report by Günther are given depths of three hundred to five hundred fathoms without definite depths for particular species. Vaillant reports *Macrorhamphosus scolopax* Linn., taken off the northwestern coast of Africa, from a hundred and twenty-eight fathoms, and a species of Aulostoma, obtained off the coasts of Morocco, from a depth of six hundred and thirty-five. *Heliastes roseus* Günt., secured in the neighborhood of the Ki Islands, is credited with a depth of a hundred and forty fathoms.

ANACANTHINI.

LYCODOIDS.

As determined heretofore the horizontal distribution of this group has included both sides of the north Atlantic to the Arctic ocean, the northeastern portion of the Pacific, and the region about Magellan's straits. Outside of these a single specimen has been secured, "said to have been received from Japan," belonging to a new species and a new genus the closest allies of which occur off the western coasts of North America. The fact that the "Challenger" expedition found none of the group in either the western Pacific or in the Indian Ocean, and that the extensive researches of the "Investigator" have discovered none in the northern reaches of the Indian Ocean suggest either an absence or great rarity of these fishes in those waters. The material on which the present report is based contains twelve species, of seven genera, from the depths eastward and northward from the Galapagos Islands toward Central America and Mexico. A statement was recently made by Collett concerning the genus Lycodes, several species of which were shown by the investigations of the "Travailleur" and the "Talisman" to occur at great depths near the equator in the eastern Atlantic, to the effect that "in all probability this genus is spread throughout from Pole to Pole, in suitable depths where a uniform [low] temperature prevails." So far as concerns Lycodes this is no longer to be classed as a probability, but rather as an established fact; and furthermore there are reasons for making similar statements relating to the genera Maynea, Lycodopsis, Phucocœtes and Lycodapus, all of which are now at hand from the equatorial portions of the eastern Pacific, though previously reported only from the far north or from the far south. The occurrence here of these genera indicates a probability of the presence of representatives of all or nearly all the genera of the entire group in the equatorial regions, or in other words in the great depths from the Arctic to the Antarctic Ocean. The required temperature is not stated by Collett, but from the evidence in the collection it ranges, for the group, from 35.8 to 42 degrees Fahrenheit, or, including that of previous expeditions of the steamer "Albatross," in the Pacific, from 35. 8 to 45 degrees, among deep sea forms, though probably reaching somewhat higher among shoal water species and lower toward the poles. Knowledge of the genus Lycodes has been considerably extended by Collett and Lütken; and Günther has brought together in the "Challenger" report about all that was known concerning the deep sea members of the group. Since their publications, by means of the different expeditions of the "Albatross," of the United States Fishery Commission, the number of species has been nearly doubled. The genus Maynea was known by a species taken at the Straits of Magellan, the "Albatross" has added a species from the eastern tropical Pacific.

From near the Galapagos it has added one species to Gymnelis, hitherto known from the Arctic extensions of Atlantic and Pacific; four species to Lycodes, one to Lycodopsis, heretofore known only from the northeastern Pacific and from Japan, and one to Phucocœtes, a genus supposed to be confined to the waters around the southern extremity of South America. It has also extended the horizontal range of Lycodapus more toward the equator, by means of specimens of a previously described species, and has brought to light from the section about the Galapagos three new species that find their nearest allies in the genus Bothrocara. The greatest depth yet noted for the Zoarcidæ is that of *Lycodes albus* Vaill., taken by the "Talisman" in the eastern middle Atlantic at 2173 fathoms. The present collections carry the vertical distribution of Maynea downward to a depth of 1471 fathoms, and that of Gymnelis is extended 1530 fathoms, to a depth of 1793 fathoms. None of the Atlantic species have yet been proved to occur in the Pacific. It is true Goode and Bean assert, 1896, Oc. Ich., p. 527, that *Lycodes paxillus* G. B. has been taken "off the coast of southern California, in 603 fathoms," but the reference they give contains nothing whatever in support of the statement.

In regard to the affinities of the specimens from the equatorial Pacific it may be said that the species of Lycodes are rather more close to those of the northeastern Pacific than to those of the northern Atlantic or to those of the far south. Nothing can be said of the affinities of the species of Maynea from Magellan's straits because of the dearth of particulars in its description. *Lycodopsis scaurus* is closely allied to species from the northward in the Pacific, while Phucocœtes finds its ally at the southern extremity of South America. Gymnelis has a not particularly close ally in the northern Atlantic and another of which few particulars are known in the northern Pacific. Taken altogether the closest affinities of the species under study appear to be with those toward the north along the western coasts of North America so far as may be determined in comparisons of specimens with more or less incomplete descriptions. All of the specimens in the collection are of deep sea species; they are of uniform darkish to deep black and bear nothing in the way of markings to serve as hints to derivation or relationship. Possibly such traces occur on younger individuals as is so frequently the case with other fishes.

Of the nine localities from which specimens of the Lycodoids were taken five are recorded as being on soft mud, one as being on the ooze, two as being from sandy and one as being from rocky bottoms. Aside from the fact that two thirds of them were caught on the soft bottom the obsolescence of the ventral fins is sufficient evidence of habits similar to those of the Discoboles, or the Eels.

ZOARCIDÆ.

Bothrocaropsis sub-gen. n.

Form slender, elongate, compressed, covered with small circular scales; similar in shape to the typical Lycodes. Eyes large. Vertical fins continuous. No ventrals. Body cavity short. Pectorals narrow, of thirteen rays. Small conical teeth on jaws, vomer, and the palatines. Lower jaw shorter, included by the upper. Bones of the skull with large cavities for the canals of the Lateral System. No barbel. Six branchiostegals; gill openings wide; gill membranes united, narrowly attached to the isthmus. Pseudobranchiæ present.

Though it has a larger pectoral it may be that *Maynea pusilla* Bean belongs to this subgenus. Evidently Bean was right in separating the type of Bothrocara, *B. pusilla* from his *Maynea brunnea*.

Bothrocaropsis alalonga sp. n.

Plate XXXII. fig. 2.

Br. r. 6; D. 98–102; A. 85–86; V. 0; P. 13.

Lycodiform, compressed, tapering and slender posteriorly; depth one ninth of the total length, or one and six sevenths times in the head. Head large, long, one fifth of the total, as wide as high at the eyes, deeper than wide across the back, broad and slightly convex on the occiput; interorbital space narrow, convex. Snout large, its length one and one half to one and two thirds times that of the eye, broad, swollen above the jaws, prominent above the vomer, bluntly rounded at the end. Mouth wide, with the maxillary subtending the anterior third of the orbit. Cleft to a vertical from the front margin of the eye. Teeth small, in villiform bands on jaws, vomer, and palatines. Eye large, one sixth of the head, more than the interorbital space, one and one half to one and three fourths times in the snout. Nostrils small, tubular, near the end of the snout. A low median longitudinal crest on the top of the back of the head. Opercle long, with a flexible point on the upper angle. Dorsal and anal confluent with the caudal fin. Origin of dorsal above the axil of the pectoral; longest rays as long as the snout; fin rising gradually both from origin and from caudal. Anal similar to dorsal, originating below the seventeenth ray of the latter. Caudal not distinct from D. and A., forming a short point. No ventrals. Distance to vent from pectoral bases two thirds of the length of the head. Pectorals one and one third times as long as the head, peculiar in being narrow at the base and greatly elongated in the rays of the upper half or two thirds of the fin. These prolongations are very flexible, and in some features resemble nuptial growths on certain other vertebrates. The rays project beyond the membranes on the edges of the fins. On a smaller specimen, of nine and one half inches, the pectorals have the same shapes but are proportionally shorter, being only as long as the head. Bones of the head not particularly firm, with extensive chambers or cavities. Skin thick on body and fins, soft. Scales very small, absent from head, shoulders and fins. Lateral line invisible.

Brownish, possibly tinted with red in life; dorsal and anal posteriorly and caudal blackish; pectorals whitish; lower surface of head whitish.

The specimen described and figured had an entire length of seventeen and one half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3436	27° 34′ N.	110° 53′ 40″ W.	905 fathoms	37.2° F.	"Br. M. bk. Sp."

Bothrocaropsis rictolata sp. n.

Plate XXXIII. fig. 1.

Br. r. 6; D. 105; A. 91; V. 0; P. 13; C. 10.

In common with the others of the genus this species has a much compressed body, in which the depth equals two thirds of the length of the head, and tapers rapidly to narrow slender and pointed in the tail. Head one fifth of the total length, high at the nape, nearly as wide as high, with a very low arch from occiput to the preorbital section. Parietal region broad, slightly convex transversely; interorbital bones half as wide as the eye; a low median keel behind the orbits on the top. Bones of skull thin, with large mucous cavities. Snout moderate, deep, blunt, one and one third times the orbital length, more pointed than that of *B. alalonga*. Mouth wide; cleft almost subtending the entire eye; maxillary reaching backward of a vertical from the hind edge of the orbit, where it is expanded widely and sends down an angle behind the intermaxillary. Lower jaw shorter, included by the upper. Teeth conical, small, in bands on the jaws, on which the outer series are slightly larger, in two or more series on vomer and palatines. Eyes large, one fifth as long as the head, length one and one third times the space on the forehead between them. Interorbital space three fourths of the length of the orbit, convex. Cheeks and nape muscular, swollen; face above the jaws or snout hardly inflated. Operculum small, hinder angle with a membranous point. Dorsal and anal fins deepest in the middle of their lengths; longest rays of the former less than one third as long as the head, shortening to caudal and nape; anal shorter. Dorsal origin above the axil of the pectoral; origin of the anal below the eighteenth ray of the dorsal. Pectorals narrow, three fifths as long as the head, sharp pointed. No ventrals. Caudal short, two thirds as long as the eye, tapering with dorsal and anal to a sharp point. Scales small, absent from head and for a short space behind it; those on the fins smaller. Lateral line apparently absent. Massiveness of head and shoulders, with rapidity of taper, give this species a short and stout appearance. Seventeen inches in total length.

Light greyish brown (? reddish in life), fins lighter, with darker edges, head whitish (reddish).

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Green mud

Bothrocaropsis elongata sp. n.

Plate XXXIII. fig. 2.

Br. r. 6; D. 117; A. 101–104; V. 0; P. 13; C. 10.

A more elongate form distinguishes this species from the other members of the genus in the collection. It is compressed and tapers to thin and slender posteriorly. The length of the body cavity is about twice the length of the head; the total length is ten times the depth. Head long, one sixth of the total, subquadrate in transsection behind the orbits, a trifle deeper than wide, slightly arched from snout to nape. Parietal region broad, flattened; skull with a low median keel, and a narrow interorbital space about two thirds as wide as the eye. Snout nearly twice the length of the eye, broadened above the jaws, somewhat prominent above the end. Mouth wide, horizontal; cleft extending little backward of a vertical from the anterior edge of the orbit; maxillary subtending half of the eye. Teeth small, conical, in villiform bands on jaws, vomer, and palatines, outer series a little the larger. Eye medium, one half as long as the snout on the largest specimen and three fourths on the smallest. Operculum small, with a membranous flap and a flexible produced upper angle. Dorsal fin higher toward the middle of its length, originating above the axil of the pectoral. Anal origin below the nineteenth ray of the dorsal. Caudal not distinct from dorsal and anal, as long as the eye, sharp pointed. Pectorals moderately broad, half as long as the head, blunt pointed, ends of rays protruding as a fringe. Scales very small, absent from head and shoulders. Lateral line not apparent. Length nineteen and one half inches.

The smallest specimen differs in certain respects from the foregoing. The head is two elevenths of the total length, the snout is about one and one half times as long as the eye, the maxillary does not reach to a vertical from the middle of the orbit, and the scales encroach on the bases of the fins only in the posterior third of the length, near the caudal. The decrease in depth in the hinder portion of the body is very regular to the slender extremity of the tail. Pectorals short, three fifths as long as the head, rounded and fringed on the hind border. Teeth conical, outer series of upper jaws much and of lower jaws but little larger. The differences seen on these individuals are mainly such as would exist between young and old, viz., shorter snout, larger eye, longer head as compared with tail, and fewer scales on the bases of the fins. Length of smallest specimen twelve inches.

Color dark brown or blackish, muscular portions lighter, fins darker.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3393	7° 15′ N.	79° 36′ W.	1020 fathoms	36.8° F.	"Gn. M."
3353	7° 6′ 15″ N.	80° 34′ W.	695 "	39° F.	"Gn. M."

Gymnelis conorhynchus sp. n.

Plate XXXI. fig. 2.

Br. r. 6; D. 89; A. 75; V. 0; P. 18–19.

In general the shape of this species is that of the average Lycodes. The body is compressed and tapering; its depth is more than one ninth of the total length, or not far from three fifths of the length of the head. Head of moderate length, two elevenths of the total, occiput flattened or slightly convex, sides diverging downward, top in a low arch between snout and occipital region. Snout elongate, twice as long as the eye, subconical, convex above the nostrils, thick and blunt. Nostrils tubular, anterior in position, near the edge of the lip. Eye half as long as the snout, equal to the interorbital space, less than one sixth as long as the head. Suborbital ridge swollen, rather more prominent than the lips, making the mouth appear inferior in position. Mouth cleft short; maxillary reaching a vertical from the front edge of the eye; upper jaws longer; lower jaws little shorter, included; intermaxillaries short. Teeth small; on the upper jaws in a couple of series at the symphysis; on the lower jaws in bands of several series; in a bunch on the vomer; and in a short series on each palatine. Gill openings moderate, extending down as far as lower edge of pectoral. Gill laminæ very short. No pseudobranchiæ. Pectoral fins broad, short, two thirds as long as the head, fringed. No ventral fins. Dorsal origin above the middle of the pectoral fin. Origin of the anal distant from the snout two and one fourth times the length of the head. Caudal short, rounded, continuous with dorsal and anal.

Scales small, not in contact but rather closely placed. Dorsal and anal scaly on their basal halves; head and pectorals naked.

Head and pectoral fins blackish; scales lighter, resembling pores. Dorsal and anal fins blackish. Muscular portion of body dark brown to blackish, with a tint of red.

Total length nine inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Green mud.

Lycodopsis scaurus sp. n.

Plate XXXII. fig. 1.

Br. r. 6; D. 95; A. 85; V. 3; P. 21; C. 10.

In this species the form is moderately elongate and tapering, and the body cavity from the snout to the vent is one and three fourths times the length of the head, or nearly one third of the total length. Head comparatively large, not far from one fifth of the total length; parietal region broader than long, flat; interorbital section narrow, longitudinally arched; snout broad, shorter than the orbit, blunt, rounded; labial region swollen in the anterior half, to below the eye. Orbit large, more than one fourth of the head. Mouth wide, hardly reaching a vertical from the middle of the orbit; lower jaws shorter, included. Teeth small, in a single row on the intermaxillaries, in a band on the mandibles, absent from vomer and palatines. Nostrils prolonged in a short tube. Pseudobranchiæ small, with six bars. Gill openings wide, membranes joined to the isthmus opposite the bases of the ventrals. Six branchiostegal rays. Pectorals short, two thirds as long as the head, broad, with twenty-one rays, scalloped on the lower portion of the hinder border. Dorsal low, long, originating above the axil of the pectoral. Anal elongate, low, first ray below the sixteenth ray of the dorsal. Caudal short, rounded, of ten rays, not distinct from dorsal and anal. Ventrals short, club-shaped, broadened toward the outer end, shorter than the eye, with notches at the outer end. Scales small, separated, comparatively few on the muscles above the abdominal chamber, more numerous posteriorly, absent from the head. Lateral line rudimentary or obsolete.

Color brownish, on fins and lower surfaces of head blackish.

Total length seven and one half inches.

This form is closely allied to *L. pacificus* Coll. but differs in numbers of fin rays, in proportions, and in color; it is also closely allied to *L. paucidens* Lock. and probably both should be placed as varieties of Collett's species. The locality given for *L. pacificus* is Japan, that for *L. paucidens* is San Francisco, California, and northward in moderate depths.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Green sand.

Lycodes anguis sp. n.

Plate XXX. fig. 1.

Br. r. 6; D. 103–109; A. 92–97; V. 2 (3); P. 17; C. 10.

When compared with others of its kindred this form presents no very great differences in shape. The body is slender and compressed, and the depth is about one sixteenth of the total length. Head narrow, with sides nearly parallel, as wide as deep, in length less than one sixth of the total, slightly convex on the occipital region, which is longer than wide. Interorbital space narrow, hardly convex, in width about one third of the length of the orbit. Snout long, one and one half times the eye, broad, subacuminate or rounded and blunt at the end. Labial region, between eye and nostrils, swollen. Nostrils with a short tube, situated near the lip and the end of the snout. Eye large, two thirds of the snout, close upon one fifth of the head. Mouth medium, cleft extending to a vertical from the front edge of the eye; maxillary not subtending half of the orbit, lower jaw nearly as long as upper; lips medium. Teeth on the jaws in four or five series near the symphysis, on the vomer in a curved series in front of the middle of which there is a short triangular group with its apex forward. A single short palatine series on each side. Branchial apertures moderately wide, extending forward from the pectoral bases almost to the ventrals. The dorsal fin and the anal widen backward so that the fins and the muscular portion together retain the depth of the anterior half as they approach the caudal. Dorsal origin above the middle of the pectoral. Anal origin distant from the snout about twice the length of the head. Depth of base of pectorals about two fifths of the length of the fin, which latter is contained one and two thirds times in the head; below and posteriorly the pectoral rays are prolonged in a fringe. Ventrals as long as the eye, ending in a flexible point; anterior ray short. Caudal continuous with dorsal and anal, short, pointed or somewhat rounded. Scales small, close together or in contact covering the body and the basal portions of the fins; absent from the head and the pectoral fins. Mucous pores around the mouth conspicuous, as also the chambers in the bones. Lateral line rudimentary, to be traced but for a very short distance from the operculum.

Brownish; darker on the head and over the cavity of the body; lighter backward on the muscular portions. Length nine inches.

This species differs from *Lycodes serpens* in that it tapers less from the back of the head forward, that the mouth is shorter, and that the teeth are finer and placed closer together. It is closely allied to *L. cicatrifer*, but tapers more from nape to snout, is less completely covered by scales, and has a more rudimentary lateral line.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3435	26° 48′ N.	110° 45′ 20″ W.	859 fathoms	37.3° F.	Br. m. bk. sp.
3436	27° 34′ N.	110° 53′ 40″ W.	905 "	37.2° F.	Br. m. bk. sp.

Lycodes serpens sp. n.

Br. r. 6; D. 103–105; A. 97; V. 3 (3–4); P. 16–17.

The types of this species were taken with specimens of *L. anguis*, from which they differ in having a longer snout, a larger mouth, deeper and shorter pectorals, and in being of a stouter build in general. The formula is nearly the same in both. The head is one fifth of the total length, or a little more, and the depth is not far from one fourteenth of the same; it widens toward the parietals and is somewhat widened from the nares forward, and on the crown forms a very low arch, with a weak median longitudinal crest behind the interorbital region. Eye medium, two thirds of the snout, one fifth of the head; length of orbit three times the interorbital distance. Snout large, one and one half times the eye, wider than deep, angled in front, with rounded or blunted apex when viewed from above. Mouth wide, cleft subtending two fifths of the eye; maxillary extending below almost the entire orbit. Nostrils small, anterior, with a short tube. Teeth small, in short bands on the jaws, in a series of six or eight on the vomer, and in a short row of four or five on the anterior ends of the palatines; outer row on the jaws of larger teeth not close together. Lips well developed. Mucous cavities in the bones large; pores large. Ventrals slender, hardly as long as the orbit. Pectorals broad, half as wide as long, rounded and fringed posteriorly. Dorsal origin little forward of the middle of the pectoral. Anal origin from the snout twice the distance to the bases of the pectorals, below the eighteenth ray of the dorsal. Scales very small, not in contact, encroaching on the bases of the fins, absent from the head.

Blackish on head and fins; brown tinged with red on the muscular portions of the body.

Length, ten and one fourth inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3436	27° 34′ N.	110° 53′ 40″ W.	905 fathoms	37.2° F.	Br. m. bk. sp.

Lycodes incisus sp. n.

Plate XXX. fig. 2.

Br. r. 6; D. 100; A. 85–88; V. 2; P. 18–19; C. 10.

The body is compressed and tapers gradually on upper, lower, and lateral outlines. From the snout to the vent is close upon twice the length of the head. Head nearly as broad as deep, tapering regularly from nape to snout, about one fifth of the total length. Occipital portion of the skull flattened, as broad as long, with a faint median ridge. Outline of skull straight from snout to nape. Snout not as deep as that of *L. cicatrifer* and others, nearly as wide as the head, rounded in front, prominent behind the nostrils at the sides; lower jaw shorter, included. Mouth wide; cleft reaching a vertical from the front of the eye; maxillary subtending the anterior half of the eye. Eye moderately large, three fifths of the snout, less than one sixth of the head. Width of the interorbital space about half the length of the orbit. Nostrils small, with short tubes, situated near the end of the snout and the edge of the lip. Teeth small, in two series on the intermaxillary near the symphysis; in four series on the mandibles; in a bunch of two or three series on the vomer; and in a single short series on each palatine. Mucous pores and cavities in the bones large. Pectorals short, about two fifths of the length of the head, broad, rounded, and deeply fringed on the outer margin, bases one diameter of the orbit in advance of midway from the snout to the origin of the anal. Origin of the dorsal above the axil of the pectoral. Anal origin below the nineteenth ray of the dorsal. Ventrals, short, two thirds as long as the eye, with two rays, stiff but slender, clubshaped. Caudal short, rounded, continuous with dorsal and anal.

Scales very small, not in contact, smaller on dorsal, anal, and caudal. Head and pectorals scaleless.

Blackish on head, belly, and fins; a little lighter or brown on the muscular portions of the body.

Total length seven inches and a half.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Green mud.

Lycodes cicatrifer sp. n.

Plate XXXI. fig. 1.

Br. r. 6; D. 112; A. 105; V. 3; P. 18; C. 11.

Though this species is easily recognized its departures from the ordinary types of Lycodes are not very marked. The body is moderately elongate, slender and compressed; the tail maintains a considerable thickness and strength to the end. Depth about one eleventh of the total length, or one half of the length of the head. Head retaining its size forward on the snout, as deep as wide, flat on the parietal region; flat area longer than broad; interorbital space narrow, higher in the median line. Midway from eye to pectoral a transverse section of the head is subquadrate. From nape to internarial region the head is nearly straight. Snout broad, thick, deep, bluntly rounded at the end, approximately twice as long as the eye. Mouth large, the cleft subtending one third, and the maxillary little more than one half of the eye; lower jaw hardly any shorter than the upper. Teeth small, in bands on the jaws, in a bunch on the vomer, and in a short single series of a few teeth on the palatines. In the outer series on the jaws the teeth are separated and larger. Lips not greatly swollen. Eyes medium, nearly half as long as the snout. Length of orbit one and two fifths times the interorbital width. Along the face the pores form large whitish excavations resembling scars. The pores of the lateral line are small; the series descends rapidly on the side of the belly, and is not to be recognized backward of the origin of the anal fin. From the snout to the vent is twice the length of the head. Scales small, absent from the head and the pectoral fins. The other fins are enveloped for the most part in a thick skin and covered by smaller scales. Dorsal and anal long, low, continuous with caudal. Dorsal origin above the middle of the pectoral. Caudal short. Pectorals broad, inserted midway from snout to vent, fringed, ending in an angle. Ventrals small nearly as long as the orbit, tapering to a very slender filament, with three rays, of which the anterior one is quite short. Total length nine and one fourth inches.

Head, pectorals, and belly black; muscular tracts brownish; dorsal and anal blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3360	6° 17′ N.	82° 5′ W.	1672 fathoms	36.4° F.	Fn. bk. dk. gn. s.

Phucocœtes suspectus sp. n.

Plate XXX. fig. 3, 3a.

Br. r. 6; D. 103; A. 85; V. 2; P. 17; C. 10.

Like most of the Lycodes this one has the head and body compressed and elongate much as in the cases of certain eels. Head short, about one sixth of the total length, nearly as wide as high, flattened on the crown; cheeks a trifle swollen; snout short, broad, blunt. Mouth wide; maxillary subtending half of eye, or a little more. Eyes medium in size, two thirds as long as the snout, less than the interorbital space, rising slightly above the superior outline of the top of the head. Chin prominent; jaws equal. Teeth small, conical; a band of several rows on the lower jaws, a single row on intermaxillary or palatine, and apparently but one tooth at each side of the vomer. The palatine teeth are the stronger. Gill opening medium, extending downward to the lower edge of the base of the pectoral fin. Distance from snout to vent equal to twice the length of the head. Pectorals short, wide, half as long as the head. Ventrals little more than half as long as the eye, with two rays, smaller than those of *Phucocœtes latitans.* Dorsal and anal long, low, not distinct from the caudal; dorsal origin above the base of the pectoral; anal origin distant from the chin twice the length of the head. Caudal short, subacute, rounded. Lateral line rudimentary. Mucous pores on the face small, not prolonged in tubes; mucous chambers apparent in the bones of the lower jaws. Scales small, separate, absent from head, fins, and a space near the bases of dorsal and anal anteriorly; posteriorly they reach the base of the fin in the hinder third of the total length.

Blackish; somewhat lighter on the upper surface and backward.

This fish differs considerably from the typical Lycodes with narrow interorbital space shorter lower jaw and thick lips, as will be seen from the figure. There is some resemblance to *Phucocœtes latitans* of Jenyns, though differing in the strong teeth, canines, and prominent tubes of that species. It may be the best place for the new species is by the side of *P. latitans,* of which a short description is here given for comparison.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.

Phucocœtes latitans.

Phucocœtes latitans Jenyns, 1842, Voy. "Beagle," Fishes, 168, pl. 29, fig. 3.

D. 100; A. 76; V. 2 right, 3 left; P. 17; C. 10.

Form similar to that of other Lycodidæ. Body and tail compressed; depth one eighth of the total length, and distance from snout to anal origin four ninths of the same. Head depressed, broader than high, one sixth of the total length and two and three fourths times in the distance from snout to vent. Snout longer than the eye, broad, blunt; upper jaw longer; lips thick; mouth wide; maxillary subtending nearly the whole of the orbit. Teeth unequal, apparently in a single series on jaws and palatines; vomerine few. Gill openings narrow, extending but half way down across the bases of the pectorals. Vertical fins continuous around the end of the tail; dorsal originating above the axil of the pectoral; anal origin below the thirty-first ray of the dorsal. Pectorals short, deep, broadly rounded on the hinder margin, two thirds as long as the head, scalloped on the edge. Ventrals stout, short, as long as the eye, with two rays on the right side and three on the left, the extremities showing like blunt digits at the end of the fin. Scales very small, absent on the anterior half. No pyloric appendages.

Brown; white below the head, around the vent, and on the margins of the pectorals; lips dark brown; top of head darker.

Length four inches.

Shell Bay, Patagonia; collected by the Hassler Expedition.

LYCODAPUS.

Lycodapus Gilbert, 1890, P. U. S. Mus., XIII, 107.

Body and head compressed and tapering. Body cavity short. Mouth anterior, wide, lower jaw longer; teeth very small, in villiform bands on jaws, vomer and palatines. Six branchiostegal rays. No barbels. No pseudobranchiæ. No ventral fins. Gill openings wide; gill membranes not united, free from the isthmus. Skin naked; a lateral line. Dorsal, caudal, and anal fins united. Pectoral narrow. No opercular or other spines on the head. Pyloric appendices few.

Lycodapus fierasfer.

Lycodapus fierasfer Gilb., 1890, P. U. S. Mus., XIII, 108.

Br. r. 6; D. 85; A. 76; V. 0; P. 8; C. 10.

Somewhat eel-shaped; body and head compressed; caudal section tapering; vertical fins continuous around the end of the tail. Length of head five and one half, and depth of body eight and one fourth times in the total length. Distance from snout to vent contained two and one third times in distance from vent to end of tail. Head compressed, nearly straight from nape to end of snout, convex transversely. Snout long, nearly three times as long as the eye, broad at the nostrils, broader than deep, blunt. Chin somewhat steep. Mouth wide, oblique; maxillary subtending the anterior third of the orbit, lower jaws longer, ending in a blunt angle below hinder part of orbit. Teeth small; in villiform bands on the jaws; in a crescent shaped band on the vomer; in a short group on each palatine. Eye small, hardly one sixth as long as the head, length rather more than width of interorbital space. No cephalic spines. Gills four, a slit behind the fourth; gill rakers 1 + 13, short, stout; lamellæ very short, those on the upper portion of the arch being rudimentary. The upper section of the first gill-arch is very short, and bears but a single raker. Branchial apertures wide; membranes not united to one another, free from the isthmus. Vertical fins moderately deep, longest ray about as long as the snout; caudal indistinct; dorsal origin slightly backward from the axil of the pectoral; anal origin distant from the snout less than twice the length of the head. Pectorals small, not far from half as long as the head, narrow, pointed. No ventrals. Caudal indistinct, apparently of ten rays. Skin naked. Lateral line nearly or quite complete. Pyloric appendages two, short and thick.

Total length six inches.

Brownish, darker on belly and near bases of fins; blackish on inside walls of body cavity, on opercles and around the mouth. The flanks are rusty brownish; all of the fins are light.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3380	4° 3′ N.	81° 31′	899 fathoms	37°.2 F.	Rocky

MAYNEA.

Maynea Cunningham, 1870, Tr. Linn. Soc., XXVII, 471.

Form approaching that of the Ophidioids. Body compressed, tapering, cavity not half the total length. Head large, rounded; snout broad and deep. Mouth wide, anterior; jaws equal. Teeth in villiform bands on the jaws, few on vomer and palatines. No barbel on the chin. Gill membranes united, joined to the isthmus. Eyes lateral. Nostrils and pores of lateral system small. Vertical fins united; pectorals broad; no ventrals. Scales on the body small, not imbricate; head naked.

Maynea bulbiceps sp. n.

Plate E, fig. 1.

Br. r. 6; D. 109; A. 89; V. 0; P. 16.

Body compressed, tapering, thick anteriorly; body cavity nearly two fifths of the total length. Head short, nearly as wide as deep, less than one sixth as long as the total, broad at the snout, convex on the crown, swollen on the cheeks, rounded at the mouth, its length two and three fourths times in the distance from snout to vent. Snout about three and three fourths times in the length of the head, blunt, broadly rounded at the jaws, convex and prominent on the internarial region. Eye small; orbit twice in the length of the snout, less than twice in the interorbital space. Mouth anterior, wide, slightly oblique, descending backward, cleft to a vertical from the anterior edge of the orbit; maxillary hardly reaching as far backward as hind edge of orbit; jaws equal; lips moderately thick. Teeth small, short but stout, unequal in sizes, in villiform bands on the jaws, in a single series of about four on each palatine, one or two on each side of the vomer; band on upper jaw narrow. Width of gill-cleft half the length of the head. Gill membranes united, broadly joined to the isthmus, which is as wide as the cleft.

Near the end of the snout toward each side there is a small tubular nostril, in front of which there is a small pore. Mucous pores very small, chambers not so noticeable as on Lycodes. Vertical fins united. Dorsal origin one diameter of the eye or more farther backward than the base of the pectoral, distant from the eye about the length of the head. Anal origin below the twentieth ray of the dorsal fin. Caudal small, not distinct, with eight or ten rays. No traces of ventrals. Pectorals strong, broad, short, two thirds as long as the head, posterior margin broadly convex. A flexible angle at the hind end of the operculum, but no spine. Scales very small, resembling pores in appearance, not in contact, absent on head and shoulders to origin of dorsal fin, smaller on dorsal and anal fins.

Color greyish brown, with an olivaceous tint; scales lighter, like small freckles; pectorals and other fins darker.

Total length 19¾ inches; body cavity 7¾; head 2⅞.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3361	6° 10′ N.	83° 6′ W.	1471 fathoms	36.6° F.	Green ooze.

OPHIDIOIDS.

The expedition obtained specimens of one species of this group, *Lepophidium emmelas* Gilb., at seven different stations. Three of the lots were taken between seven and eight degrees of north latitude, near the meridian of eighty degrees west longitude, and the four others about eight degrees farther north and nearly twenty degrees farther west. The lots taken at the northward have a slightly darker appearance than those taken farther south, those secured nearer the surface are lighter in colors than those from the deeper levels, and the younger individuals are not so dark as the older. The youngest specimens were captured in the shoalest water; those taken at a depth of 94 fathoms were all less than three inches in length. The rostral spines are prominent on those of a length of one and one half inches. The specimens described by Gilbert were obtained about ten degrees still farther to the northward and as many degrees still farther toward the west, which, with the present material, gives the species a determined range included between the parallels of seven and twenty-six degrees of north latitude, and between the meridians of seventy-nine and one hundred and twelve degrees of west longitude. The vertical range reaches from a depth of 94 to one of 511 fathoms. The temperatures of the bottom range from 40.6 degrees above zero Fahrenheit for the greatest depths to 56 degrees for the depth nearest the surface, from which latter, as it happened, the youngest specimens were caught. Apparently the species deposits its spawn in the shoaler waters under the warmer temperatures, and within reach of the sunlight, and retires to the cold and the dark of the levels farther down. This in case of individuals from five hundred fathoms or more below the surface would call for a very considerable vertical migration in the breeding season. Of nine parcels of specimens eight were caught on the soft mud and one on the sand.

The genus Lepophidium includes several species from the Atlantic coasts of the United States to the Caribbean Sea and Brazil, and as many, rather more closely allied, from the Eastern Pacific.

OPHIDIIDÆ.

Lepophidium emmelas.

Leptophidium emmelas Gilb., 1890, Pr. U. S. Mus., 110.

Plate LXXIII. fig. 3, Lat. Syst.

Br. r. 7; D. 105–109; A. 83–91; V. 2; P. 25–27; C. 10; Ll. 130–138; Cæca 5, rudimentary.

Total length of specimen described seven and one half inches; head one and seven eighths. Body compressed, tapering to an acute point, greatest depth four fifths of the length of the head, or less than one fifth of the total. Head moderately large, near one fourth of the length without the caudal, somewhat thick, as wide as high, depressed anteriorly, nearly straight from snout to nape, where the outline rises a little higher. Snout broad, short, two thirds as long as the eye, blunt, prominent in a forward directed rostral spine, behind which a short distance another spine is directed upward. Mouth wide, lower jaws included; maxillary widened at the end, which reaches little farther backward than the eye, not in contact with the cleft. Teeth small, in villiform bands of one to several series each, on jaws, palatines and vomer. Vomerine band forming an angle with apex forward, or arched with sides slightly curved near the outer ends. Eye large, one and one half times as long as the snout, one fourth as long as the head, wider than the interorbital space. A short, inconspicuous spine at the hinder edge of each posterior nostril; anterior nostrils semitubular. One specimen has two upright spines behind the rostral. Gill rakers slender, longest half as long as the eye, one upper and nine lower developed, besides several rudiments. Vertical fins continuous, anal little deeper than dorsal, caudal acute; dorsal origin above axil of pectoral; anal origin about two lengths of the head from the snout. Pectorals short, rather broad, half as long as the head. Ventrals below the forward end of the hyoid, inner ray longer, half the length of the head. The ventrals appear to be in advance of the humeral symphysis, but really are included by two long processes from the arch, which meet at their anterior ends, inclosing the bases of the ventrals as directed upwards toward the forward end of the hyoid, which forms a wide inverted trough containing the presymphyseal processes of the humeral arch. On account of the long extensions the ventral fins, though displaced in appearance, are really back of a humeral symphysis, as in most other fishes. The ventral rays are modified to form barbels. From the ventrals to the vent is twice the distance from the ventrals to the bases of the pectorals. Scales small on head and body, very thin and flexible. Snout bare. Vertebræ 13 + 44. From the least depths the specimens are a trifle more stout and lighter in color.

Dingy or clouded brown, top of head darker, edges of scales darker, borders of dorsal and anal black. Pectorals dark, tipped with lighter. Lining of mouth cavity whitish, of belly black. Color on the fins in close set puncticulations.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. S.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 "	48° F.	Fne. gy. S.
3394	7° 21′ N.	79° 35′ W.	511 "	41.8° F.	Dk. gn. M.
3417	16° 32′ N.	99° 48′ W.	493 "	40.6° F.	Gn. M.
3421	16° 47′ 20″ N.	100° 0′ 10″ W.	338 "	42.9° F.	Dk. gn. M.
3422	16° 47′ 30″ N.	99° 59′ 30″ W.	141 "	53.5° F.	Gn. M.
3423	16° 47′ 30″ N.	99° 59′ 20″ W.	94 "	56° F.	Gn. M.

BROTULOIDS.

The Brotuloids are so pre-eminently inhabitants of great depths that much the greater portion of the group is of recent discovery. Before the "Challenger" expedition comparatively few species were known. From the collections made by that vessel fifteen or sixteen new species were described; later the different steamers of the United States Fishery Commission gathered about as many more; the French steamers "Travailleur" and "Talisman" added seven or eight; the Royal Indian Marine Surveying Steamer "Investigator" brought to light about twenty; and the work of the United States Fish Commission Steamer "Albatross" between the Galapagos Archipelago and the mainland of Central America and Mexico makes an addition of the twenty or more described below. All told the list of species is at present more than five times as large as at the beginning of the deep sea researches. Horizontally the distribution extends from the polar regions to the tropics in all seas; that the representation from the southern oceans is so small is no doubt accounted for by lack of search in those waters.

Such depths to the northward as have been dragged with more thoroughness appear to have swarmed with Brotuloids. The definitely ascertained distribution of the group includes the Atlantic in the entire northern portion and southward off the coasts of Brazil to the Straits of Magellan, the Pacific in the Panamic region both sides of the northern portion and the southwestern part, off Australia, and New Guinea, and the northern extensions of the Indian Ocean. In the vertical ranges the greatest depths yet obtained lie in the northern Atlantic at 2500 fathoms where the species *Mixonus lateralis* Günt., and *Bassozetus tænia* Günt., were taken by the "Challenger," and *Alexeterion Parfaiti* Vaill., at 2736 fathoms by the "Talisman." The "Challenger's" greatest depth for these fishes in the Pacific was that of *Typhlonus nasus* Günt., northeast of Australia at 2440 fathoms. The greatest depths recorded by the "Investigator" were those of *Neobythites pterotus* Alc., and *Dermatorus melanocephalus* Alc., in the Bay of Bengal at 1748 fathoms. In the present material of the "Albatross" from the Galapagos section the deepest bottom appears in the case of *Holcomycteronus digittatus,* a new species of a new genus, at 2232 fathoms. There is reason to believe some of the young Brotuloids begin life nearer the surface.

Habitually the Brotuloids rest on the mud of the sea bottom, like the Lycodoids and as also in the cases of the latter, this habit has led to obsolescence of the ventrals until the usefulness of these fins as means of progression is completely at an end and they remain in many instances only as comparatively insignificant organs of touch. As seen in the group the various modifications of the ventral fin range from the two distinct filamentary rays to the two rays bound together, the single bifid ray, the single simple filament, and the entirely obsolete. Aside from these *Holcomycteronus* possesses ventrals each of which is composed of two separated rays, the distal ends of which are so expanded that they resemble small oars. In the pectorals likewise a variety of modification has obtained. Useful in balancing and in making quick rushes ahead or back, in all cases these fins are at least moderately developed. Though the fin is of the normal shape in the greater number of the genera, it takes on peculiar forms in others; thus on Nematonus, Mixonus, Dicrolene, and Pteroidonus from one to ten of the lower rays are separate elongate and enlarged as if for tactile purposes, on Sciadonus the carpalia are elongate and the fin is placed at the end of an arm, and on Eretmichthys the lower half of the fin is much enlarged, lengthened, and strengthened, the rays being bound together to form a broad rigid oar that must be of great advantage in making a sudden dash forward and upward (see Plate XXXV., fig. 1, also figs. 2 and 3 showing the processes for attachment of the muscles controlling the rays).

Quite generally the membranes of the dorsal and the anal fins are continuous with the membrane of the caudal fin; examination of the type proves *Barathrodemus manatinus* of Goode and Bean to be no exception to this.

On some of the genera the eyes are comparatively large; on others they are small; and on a few they are rudimentary or absent, as on Aphyonus, Typhlonus, and Sciadonus (Plate F, fig. 4). The peculiar conditions apparent on Leucicorus, Plate XXXVIII., probably indicate deterioration and loss later in life of an eye that in the earlier stages of the individual may have been serviceable and normal.

The Lateral System is well developed on the head; frequently it is imperfect or absent behind the body cavity; in cases it appears to be absent from the entire body, and in others, as on Porogadus, several lines of the system are to be seen immediately behind the head. Because of the prominence of the cephalic portion of the system in all the members of the group it has been studied on a number of the genera and species for comparisons in regard to derivations and affinities, Plates LXXV–LXXXI. From these the comparisons have been extended to various other groups near and remote. No doubt the system, in addition to its sensory function among shoal water types, has become luminous, and possibly in cases electric, at greater depths. The peculiar disks in the canals, hardly to be detected in those of the shoals, attain much greater development on the bathybial species and, in position and arrangement clearly indicating genetic relationship through common ancestry, are similar in families that in our systematic arrangements are widely separated. Compare, for instance, the Berycoids, Plate LXXII., with the Brotuloids, Plates LXXV., or the Macruroids, Plates LXXXIII., LXXXIV. The affinities of closely allied species are to be seen in comparing the figures of Plate LXXV. with the figures of Plate LXXVI. In a couple of the species the nerves have been traced from the disks to the brain and from the brain to the disks, Plate LXXVIII. The complicated distribution of the nerves and vessels in the disks and between them is shown on Plate XXXV., fig. 4, Plate XXXVIII., fig. 7, and Plate XXXIX., fig. 2.

BROTULIDÆ.

LEUCICORUS gen. n.

Myxoniform, elongate, slender, compressed, covered by scales on body and head. Head medium, short, rounded; snout broad, blunt; mouth wide, anterior; jaws nearly equal. Teeth small, in villiform bands, on jaws, vomer, and palatines. Skeleton firm. Muciferous cavities highly developed on the skull. Eye peculiar, eyeball rudimentary, obsolescent, no iris nor pupil apparent, no orbital fold. Hinder nostrils far apart, close in front of the eyes; anterior half way from the posterior to the edge of the lips. A median keel on the top of the snout, another at the occiput. An opercular spine. A short slit behind the fourth gill. Gill filaments short. Gill rakers slender, numerous. Pseudobranchiæ rudimentary. Branchiostegal rays eight. Tongue margins free. Vertical fins confluent; caudal narrow; ventrals small, close together, at the humeral symphysis, each composed of two rays bound together. No pyloric appendages. Pectorals simple.

This genus is closely allied to Mixonus but differs in the simple pectorals, in which the lower rays are weaker and united by membrane to the upper, in the rudimentary pseudobranchiæ, the rudimentary eyes, and the extraordinary development of the mucous system.

Leucicorus lusciosus sp. n.

Plate XXXVIII.; Plate LXXIV. fig. 1, Lat. Syst.

Br. r. 8; D. 110–119; A. 95–101; V. 2; P. 24; Ll. ca. 148; Ltr. ca. 35.

Compressed and elongate in form, depth near one seventh of the total length. Head medium, near one fifth of the total, nearly as broad as deep. Snout broad, somewhat prominent in the internarial region, longer than the eye, about two thirds as deep as broad. Crown slightly convex, with a thin skin and very thin transparent scales over the mucous cavities, which extend over the entire upper surface and are probably light producers. Orbit lateral, upper edge bony, strong, prominent; no orbital fold. Eye rudimentary, apparently without pupil or iris, and with the ball greatly reduced and covered with black pigment. The eye differs greatly in appearance from that of other species of Brotuloids and suggests a possible adaptation to sensation from phosphorescence, or perhaps a modification fitted for the production of phosphorescent light. Posterior nostrils widely separated, in front of the eyes and close to them; anterior half way from the posterior to the end of the snout. Mouth wide, anterior; jaws equal; maxillary broad and indented on the hinder edge, where it is as deep as the orbit, extending little backward of the eye, nearly hidden by the expanded suborbitals. Tongue with a median angle in front, edges free. Teeth small, equal, in villiform bands on jaws, vomer, palatines, and in the the pharyngeal groups. Upper groups on the pharyngeals large; vomerine band V-shaped, rather deep on the median line with arms curving back and sidewise. Opercular spine small, hidden. The head is well covered by the mucous or light-producing cavities; a large area occupies the interorbital and internarial spaces; a branch from this passes back at each side of the occiput and nape above the opercle where it ends in an ear-like flap; another branch passes below the eye on each side from the nostrils to the preopercle, and a wide series of chambers passes back under each lower jaw and up on the properculum to end behind the eye. There are eight cavities in either maxillary or mandibular series, and six in each suborbital. Gill membranes not united, free from the isthmus; gill openings wide. Gills four, a short slit behind the fourth; laminæ short; rakers slender, about nine with four rudiments on the lower section of the first arch, and four rudiments on the upper portion, longest equal height of orbit. Pseudobranchiæ a pair of rudiments on each side. Dorsal origin above the axil of the pectoral; anal origin below the nineteenth ray of the dorsal. Caudal united at the base with dorsal and anal, narrow, elongate, three fifths as long as the head, acute. Pectorals small, simple, less than half as long as the head, lower rays weaker and connected by membrane with the balance of the fin. Ventrals small, slender, filamentary, each composed of two rays bound together, situated close to one another at the humeral symphysis. Distance from ventral bases to vent about equal to length of head. No pyloric caeca. Small sensory papillæ on the snout at the openings of the vessels more developed than in Mixonus.

Color in alcohol brownish, but numerous remnants of red or crimson over head and body indicate that in life the animal was red or purplish. White areas, the mucous channels and cavities, cover the head, and may have been light producers.

Length of specimen described eleven inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3415	14° 46′ N.	98° 40′ W.	1879 fathoms	36° F.	Br. M. glob. Oz.

Mixonus caudalis sp. n.

Plate XXXVI. fig. 2; Plate XXXIX. fig. 2; Plate LXXIV. fig. 2, Lat. Syst.

Br. r. 9; D. 97–103; A. 73–81; V. 2 (1); P. 14 + 2; C. 6; Ll. ca. 150; Ltr. 28.

The following may be added to the generic characters as given by Günther: Branchiostegal rays nine; pyloric cæca rudimentary; a membranous connection between the lower two rays of the pectorals; pseudobranchiæ rudimentary; an air bladder.

Body elongate, compressed; body cavity little more than one third of the total length. Head short, one sixth of the total, deeper than wide, decidedly convex on the crown, slightly swollen at the top of the snout. Snout one third longer than the eye, broad, rounded, not deep. Mouth wide, anterior. Maxillary at its end wider than the eyes, extending backward of the orbit more than the length of the latter. Tongue free at its edges. Teeth small, in villiform bands on jaws, vomer, palatines, and pharyngeals. Vomerine teeth in three groups, a large median at the forward angle, and a small narrow group at each side near the palatines; rarely the groups are united by a slender band on one or both sides of the vomer. Eye normal, small, one sixth as long as the head, one half as wide as the interorbital space, three fourths of the length of the snout; orbit without the bony supraorbital covering seen in Leucicorus. A groove forward of the anterior nostril. Mucous cavities and pores moderately large, arranged as in Leucicorus but less extensive. Over the muciferous cavities the skin is translucent, as if the contents were luminous. Gill openings wide; membranes not united, free from the isthmus. Gills four, a short opening behind the fourth. Pseudobranchiæ small. Gill rakers close together, rigid, slender, as long as the eye, upper section of the first arch with three rudimentary and a couple of long ones, and lower with thirteen or fourteen long ones and four or five rudiments. Dorsal origin above the base of the pectoral. Anal origin below the twenty-fifth ray of the dorsal. Caudal extending much beyond dorsal and anal, with which fins it is united near its base, narrow, acuminate, three fourths as long as the head. Pectorals narrow, with two of the lower rays free in the greater portion of their length, prolonged beyond the balance of the fin, reaching behind the origin of the anal fin. The distance from the snout to the ventrals is contained one and three fourths times in that from ventrals to the first anal ray. Ventrals close together, at the humeral symphysis, each consisting of two rays closely bound together, four fifths as long as the head. Scales small, deciduous, thin, flexible, roughened on the exposed surface, covering head and body. A small anal papilla. Air bladder rather large.

Red or purple in life; gill membrane, median line of belly, dorsal, anal, caudal, and a spot on the basal portion of the pectoral black, as also the linings of mouth, gill chamber, and belly.

Length of specimen described twelve inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 fathoms	36.8° F.	Gn. M. S. rocky
3366	5° 30′ N.	86° 45′ W.	1067 "	37° F.	Yl. glob. Oz.
3376	3° 9′ N.	82° 8′ W.	1132 "	36.3° F.	Gy. glob. Oz.
3400	0° 36′ S.	86° 46′ W.	1322 "	36° F.	Lt. gy. glob. Oz.

Dicrolene filamentosa sp. n.

Plate F, fig. 1; Plate LXXV. fig. 2, Lat. Syst.

Br. r. 8; D. 100–104; A. 84–90; V. 2; P. 14–18+9–11; C. 6; Ll. ca. 140.

Body compressed, tapering rapidly, depth three fourths of the length of the head, caudal region slender. Head nearly one fifth of the total length, thick, deep, arched and convex on the forehead, interorbital space twice the length of the eye, width of crown more than half the depth of the head. Snout broad, blunt, once to one and one fourth times as long as the eye; chin slightly ascending forward. Mouth large, cleft extending backward of the orbit; maxillary reaching farther back nearly one diameter of the eye, much expanded at the end. Tongue with margins free. Teeth small, in narrow villiform bands on jaws, vomer and palatines. Vomerine group small, on the forward extremity of the bone, widely separated from the palatines. Anterior nostril porelike, half way from the posterior to the end of the snout, with a groove below and forward to the lip; posterior near the eye. Eye medium, half as wide as the interorbital space, less than the snout, hardly one sixth of the head. Opercular margins thin and membranous; spine weak. Preopercular spines three, small. Mucous system well developed, pores large, cavities in the bones of the skull moderate. Gills four, a slit behind the fourth, lamellæ short. Gill rakers slender, longest as long as the eye, five on the upper section of the first arch, twelve and five rudiments on the lower section. The lower two of the three small preopercular spines are closer together. No pseudobranchiæ. A small anal papilla. Five short pyloric appendices. Lower half of the pectoral base better developed; the rays from this half are free, long, and slender, the longest reaching to the middle of the anal fin or in the young farther back, twice as long as the head or more. The upper portion of the fin is half to two thirds as long as the head and contains thirteen to eighteen rays while the lower half has but nine to eleven. Each ventral has the appearance of a simple filamentary ray but is composed of two segmented unequal rays bound together; the two ventrals are close together at the humeral symphysis. Dorsal and anal low, with scaly bases, apparently continuous with the base of the caudal, which last is slender and acuminate. Dorsal origin above the axil of the pectoral, and anal origin less than a length of the head farther back. Scales small, thin, about ten to the inch on the middle of the body on a seventeen inch specimen. Individual described from Station 3418.

Blackish on head, body and fins; linings of mouth, gill chamber, and belly black.

On young specimens the snout is shorter, the eye larger, the body more slender, and the longest of the free pectoral rays is more than twice as long as the head.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.
3394	7° 21′ N.	79° 35′ W.	511 "	41.8° F.	Dk. gn. M.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Gn. S.

Dicrolene nigra sp. n.

Plate XXXVII. fig. 2; Plate LXXV. fig. 1, Lat. Syst.

Br. r. 8; D. 112–119; A. 93–104; V. 2; P. 18–19 + 6 (rarely 7); C. 6.

Total length of the specimen described (from station 3402) ten and one half inches; head one and three fourths; caudal three fourths; longest ray of the pectoral two and three fourths; depth one and one half; snout to dorsal fin two and one fourth; and snout to anal fin three and one half. Body compressed, elongate, tapering to very thin and narrow near the caudal fin; body cavity about one third of the total length. Head short, not far from one sixth of the total, moderately thick and convex at the top.

Snout short, as long as the eye, thick, broad, blunt, scarcely projecting beyond the mouth. Hinder nostril near the eye; anterior as near the lip, with a groove down and forward. Mouth large; maxillary not in contact, half as long as the head, becoming wider than the eye backward, with upper, lower, and hinder edges concave. Teeth small, in villiform bands on the jaws, in narrower bands which make a short curve inward at the forward ends on the palatines, and in a small group below the forward end of the vomer. Eye of medium size, as long as the snout or the width of the interorbital space, two ninths of the head. Gills four, a slit behind the fourth; laminæ short; rakers stout, longest two thirds as long as the eye, four on the upper and ten to twelve on the lower section of the first arch. Gill openings wide; membranes not united, free from the isthmus. Eight branchiostegal rays. No pseudobranchiæ. No barbels. Opercle with a slender horizontal spine at the upper angle, three fourths as long as the eye; preopercle with three rather short spines, the median little longer, the spaces separating them about equal. A small spine above the hinder border of each eye. Membranes of dorsal and anal continuous with the base of the caudal. Anterior rays of the dorsal a little longer than those of the anal, longest ray more than one third of the length of the head, first a trifle backward of the axil of the pectoral, twentieth nearly above the first anal ray. Each ventral of two rays, which are bound together for a short distance at the base. Caudal of six rays, slender, acuminate, free from dorsal and anal in greater portion of the length. Upper portion of pectorals as long as the head; lower part with six free rays, rarely seven, the longest of which is one half longer than those in the fin web, or less than one and one half times as long as the head. Scales small, thin, flexible, five or six rows between the lateral line and the dorsal fin. Lateral line near the base of the dorsal, distinct in the anterior two thirds of the length. In specimens of eighteen inches the snout is longer than the eye; the eye is about one fifth of the length of the head; the maxillary extends backward of the orbit nearly two thirds of the orbital diameter, the hind margin equalling the length of the eye, and the lower angle being acute. Five or six pyloric cæca, short and thick. Air bladder large.

Coloration of large individuals black. On the younger ones the bases of the fins appear whitish and the muscular tracts reddish brown.

Readily distinguished from *D. filamentosa* by the small number of free rays in the pectorals.

On one individual the ventral of one side has but a single ray, while that of the other side has two.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.
3380	4° 3′ N.	81° 31′ W.	899 "	37.2° F.	Rks.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 "	42.3° F.	R. glob. Oz.

Dicrolene pullata sp. n.

Br. r. 8; D. 103; A. 90; V. 2; P. 17 to 18 + 7; C. 8; Ll. ca. 170.

The specimen from which the description is drawn was taken at Station 3395. The shape is that of *D. nigra;* the stronger spine and the fewer free pectoral rays of that species are present with the shorter dorsal of *D. filamentosa.* Head four and three fourths times in the total length; crown convex. Snout broad, rounded, more than one and one half times as long as the eye. Hinder nostril near the front of the eye; anterior halfway to the end of the snout, with a groove below and forward to the lip. Length of the eye two thirds of the width of the interorbital space, less than two thirds of the length of the snout, less than one sixth of the length of the head. Mouth wide, cleft half the length of the head; maxillary reaching backward of the eye one half of the ocular diameter, very wide at the end, one third wider than the eye. Tongue rudimentary. Teeth in villiform bands on jaws and palatines. Vomerine group small, one fourth as wide as the eye. Palatine bands curving inward at the forward ends. Gills, rakers, laminæ, and membranes as in *D. nigra.* No pseudobranchiæ. Dorsal origin about the width of the eye backward of the axil of the pectorals. Anal origin below the twentieth dorsal ray. Ventrals of two unequal, separated, filamentary rays, about two fifths as long as the head. Pectoral fin with seventeen or eighteen rays in the upper part, which is not as long as the head, and seven free rays in the lower section, the longest ray being one and one half times the length of the head. Caudal elongate, slender, of eight rays, united with dorsal and anal near the base.

Seventeen inches in total length.

Uniform black.

Hardly entitled to more than varietal distinction from the typical *D. nigra.*

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3395	7° 30′ 36″ N.	78° 39′ W.	730 fathoms	38.5° F.	Rocky.

Porogadus longiceps sp. n.

Plate F, fig. 2; Plate LXXVI. fig. 1, Lat. Syst.

Br. r. 8; D. 183–184; A. 149–152; V. 2; P. 20; C. 6.

The specimen described has a length of eighteen inches. Compressed, elongate, very slender in the caudal portion, depth three fourths of the head. Head one sixth of the total length; parietal region flattened, with a pronounced angle at each side; snout long, two and one half times the length of the eye, widened opposite the posterior nostrils, and rounded from this point forwards. In an upper view the head bears some resemblance to that of Esox. The skull has a strong median internarial ridge and backward of this on the interorbital space there are two short keels. The opercular spine is prominent and strong; the spines on the preopercular region, those at each side of the parietals, and the group immediately behind each posterior nostril are very small. On larger specimens the spines are more reduced; on smaller ones, again, they are comparatively much more developed. Small individuals have two series of preopercular spines, an anterior of three and a posterior behind the mucous cavities of six smaller ones on the hind edge of the preoperculum. Seen from the side the head is pointed, the depth at the end of the snout being little. Mouth very wide; maxillary extending backward more than half the length of the head, one diameter of the orbit farther than the eye, its width at the end equal the length of the orbit. Teeth small, equal, in villiform bands on jaws, vomer, palatines, basibranchials, and pharyngeals. Vomerine band narrow, V-shaped, with apex forward and arms curving outward. Tongue rudimentary. Eye small, two fifths as long as the snout, one half of the interorbital space, and about one eighth as long as the head. Gills four, a short slit behind the fourth; rakers slender, close together, four, three of which are rudiments, on the upper branch of the first arch, and eighteen, five or six being rudiments, on the lower. On the older specimens the rakers deteriorate and become club shaped or otherwise deformed. Pseudobranchiæ small. Pyloric cæca three, rudimentary. Vertical fins continuous around the tail; dorsal origin above the axil of the pectoral; anal origin to snout one third of the total length, first anal ray below the twenty-seventh ray of the dorsal; caudal very small, slender, longer than the orbit, pointed, extending beyond the ends of dorsal and anal rays. Pectoral bases narrow, situated low on the side, fin small, pointed, about three fifths as long as the head. Ventrals slightly separated at their bases, by nearly one half the width of the eye, of two slender filamentary rays, separated in much the greater part of their length; lower ray the longer, nearly as long as the head, upper little more than half as long. The distance from the ventrals to the anal is not far from the length of the head. The uppermost of the three lateral lines reaches the base of the dorsal nearly above the vent; the median extends much farther toward the caudal, like the lower from below the base of the pectoral along that of the anal.

In some cases appearances indicate a continuation of the upper line along the base of the dorsal fin.

Scales small, very thin, covering body and head.

Head, body, fins and linings of mouth and body cavity brown to blackish; reddish over the muscular portions, where the scales have been removed, with tints of purple on the head.

Largest specimen nineteen and one half, and smallest five and one half inches, the latter is very young which may account for its presence so near the surface, Station 3370.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 fathoms	54.8° F.	Rks. and S.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 "	35.8° F.	Gn. M.
3382	6° 21′ N.	80° 41′ W.	1793 "	35.8° F.	Gn. M.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.

Porogadus atripectus sp. n.

Plate XXXVII. fig. 3.

Br. r. 8; D. 196; A. 157; V. 2; P. 17–18; C. 6.

Body moderately compressed, very long and slender in the caudal portion. Head scaly, rather thick, depressed on the frontal region, flattened on the crown, depth equal to nearly half of the length, which latter is one seventh of the total length. Snout long, moderately broad, blunt, rounded, one and one half times as long as the eye. Mouth very wide, cleft reaching backward of the eye. Maxillary separated from the mouth by the intermaxillary, nearly as wide as the eye at the end. Teeth in villiform bands on jaws, and palatines; a short band on the basibranchials; and a V-shaped group on the vomer. Eye medium, two thirds of the interorbital space, five eighths as long as the snout, less than one fifth of the head. Internarial ridge moderately prominent; a prominence above the tip of the snout. Bones of the skull cavernous; two series of three to five short spines each on the edges of the preopercle; a thin, flattened, keelless, blunt spine on the upper edge of the opercle; two to four short spines apparent to the touch above each eye. Gills four, a slit behind the fourth; rakers elongate, one and one eighth times as long as the eye, slender, two and several rudiments on the upper portion of the first arch and fourteen besides a number of rudiments on the lower part. Anterior nostril smaller than the posterior and half-way from it to the end of the snout. The distance from the occiput to the first ray of the dorsal equals that to the front edge of the orbit. Caudal united to dorsal and anal, but extending beyond them. Pectorals small, about two thirds as long as the head, prolonged in filaments. Ventrals thread-like, of two rays partly bound together, inserted below the subopercle, close together, in length four fifths the length of the head. A lateral line of six or seven cavities appears immediately behind the head about six scales below the dorsal fin, below this six or seven scales, again, there is a similar line continued farther back, and at the lower edge of the base of the pectoral there is a line that is continued along the base of the anal fin.

Scales small, very thin and flexible, about twenty-six between the anterior rays of dorsal and anal.

Snout, lower portion of head, cheeks, chest, belly, and linings of mouth and body cavity black; top of skull from nostrils backward light, possibly luminous in life; body flesh color with indications of having been darker and tinted with more or less brilliant red or purple when alive; dorsal and anal yellowish or whitish on the basal portions and black on the outer edge.

Total length twelve and one-half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard.
3366	5° 30′ N.	86° 45′ W.	1067 "	37° F.	Yl. glob. Oz.
3419	16° 34′ 30″ N.	100° 3′ W.	772 "	39° F.	Gn. M. bk. Sp.

Porogadus breviceps sp. n.

Br. r. 8; D. 174–178; A. 145–150; V. 2; P. 17; C. 5 (6).

In this species the head is shorter, wider, and more convex and the snout broader and more blunt than in either *P. longiceps*, or *P. atripectus*. The body is compressed and slender; its greatest depth is about one tenth of the total length; the length of the body cavity is contained three and one half times in the total. Head one seventh of the entire length; width of the parietal section equal to the rostrorbital length; arched across the crown and forehead, and flattened some above the orbits; cephalic spines short, opercular spine with a keel; angles low. Snout broad, blunt, broadly rounded in front, as seen from above, length equal to the width across the eyes, or to one and one half times the length of the orbit. Mouth large, cleft nearly half the length of the head; maxillary extending one half the orbital length backward of the orbit, greatest width three fourths of the length of the orbit, upper, lower, and hinder margins concave. Teeth very small, in villiform bands on jaws, palatines, and on the V-shaped end of the vomer. Eye moderately large, two thirds of either rostral length or width of interorbital space, less than one fifth as long as the head. Bones of the skull thin, mucous cavities greatly developed. The two series of preopercular spines are quite small and short; the other spines of the head are located as in *P. longiceps*, but are so small as to be found more readily by the touch than by the sight. Dorsal origin but little backward of the axil of the pectorals. Anal origin below the twenty-third ray of the dorsal fin. Pectorals small, narrow, four sevenths as long as the head. Ventrals of two filamentary rays, separate nearly to their bases; longest ray as long as the pectoral fins. Caudal region slender, fin thread-like. Lateral lines three, more distinct anteriorly, uppermost short.

Sides of the head, from the nostrils, maxillary and operculum, and chin, belly, and fins black; top of head to suborbital tract white; muscular tracts light reddish brown. There are indications of a red or purple cast over the muscles and the bases of the fins in life.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3435	26° 48′ N.	110° 45′ 20″ W.	859 fathoms	37.3° F.	Br. M. bk. Sp.
3436	27° 34′ N.	110° 53′ 40″ W.	905 "	37.2° F	" "

MONOMITOPUS.

Monomitopus Alcock, 1890, Ann. Mag. N. H., VI., 297.

Body and head compressed, covered with scales. Head short and deep; skull with median keels. Lateral line near the dorsal fin, distinct anteriorly. Mouth anterior, wide, oblique. Teeth small, numerous, in villiform bands on jaws, vomer, and palatines. Eight branchiostegal rays. Pseudobranchiæ rudimentary. Gills four, a slit behind the fourth, lamellæ very short. Gill membranes not united, free from the isthmus. Eye lateral. Snout short, blunt. Opercular and preopercular spines present. Pyloric cæca short, comparatively few. Ventrals near the humeral symphysis, close together, with a single ray. Pectorals small, simple. Vertical fins united and their bases invested by thick skin and scales. Species with a narial groove.

The type specimen of *Dicromita Agassizii* G. B., has small pseudobranchiæ, and may belong to one of the two subgenera typified by the species described below and figured on Plate XL., *Monomitopus torvus* and *Monomeropus malispinosus*.

Monomitopus torvus sp. n.

Plate XL. fig. 1.

Br. r. 8; D. 107–111; A. 86 to 95; V. 1; P. 32–33; C. 8; Ll. ca. 190; ltr. ca. 55.

Body and head compressed, tapering; depth four fifths of the length of the head. Head about one fifth of the total length, arched across the forehead. Snout longer than the eye, little narrower forward, blunt, not swollen but slightly prominent above the mouth. Eye moderately large, hardly one fifth of the length of the head, two thirds as wide as the interorbital space, four fifths as long as the snout. Mouth large, maxillary extending backward behind the orbit one third of the diameter of the latter. Teeth small, equal, on jaws, vomer and palatines, in villiform bands. Vomerine teeth in a V-shaped band, in which the apex is forward and swollen. Posterior nostril near the front of the eye; anterior near the end of the snout, with a slight groove to the lip. Gill apertures wide; membranes not united, free from the isthmus. Pseudobranchiæ rudimentary. Gill rakers slender, two thirds as long as the eye, ca. 8 + 18. Opercular spine strong. Preopercular spines short, compressed, rather wide in the bases. Suborbital bones prominent, reaching down in a sharp edge over the maxillary. Basal portions of fins with thick skin and covered by scales. Dorsal origin above the axil of the pectoral. Anal origin below the twenty-second ray of the dorsal, twice the length of the head from the end of the snout. Caudal narrow, slender, about two fifths as long as the head, acute, united with dorsal and anal near the base. Pectoral short, comparatively deep, half as long as the head. Ventrals very small, threadlike, as long as the pectorals, close together, little behind the humeral symphysis, with a single ray. The distance from snout to vent is more than one third of the total length. Scales very small, deciduous, entirely covering body and head. Pyloric cæca eight or nine. Lateral line distinct on the anterior half of the length. The preopercular spines, or angles, are less prominent and weaker in the young. Posterior nostril close to the eye; anterior on a slightly tumid prominence at each side of the snout halfway from the posterior to the end and about the same distance from the lip.

Described specimen eight and three fourths inches in length.

Dark brown; gill membranes, linings of mouth, branchial chamber and belly, and fins black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.
3384	7° 31′ 30″ N.	79° 14′ W.	458 “	42° F.	Gn. S.
3394	7° 21′ N.	79° 35′ W.	511 “	41.8° F.	Dk. gn. M.

Monomeropus malispinosus sp. n.

Plate XL. fig. 2.

Br. r. 8; D. 99; A. 82; V. 1; P. 26; C. 8; Ll. ca. 110.

Body narrow, tapering regularly, nape high; depth equal length of head or two elevenths of the total length. Head moderately compressed, prominently convex from mouth to interocular space, and rather less so to and on the occiput, about five and one half times in the total. Snout short, four fifths as long as the eye, rounded, blunt, high in the internarial region, covered by scales. Mouth large, cleft descending backward in a wide curve to a vertical from the hind border of the eye; maxillary reaching two thirds of a diameter of the eye farther back, much widened at the posterior extremity, wholly separated from the mouth cleft by the intermaxillaries; intermaxillary not extending farther backward than the hinder edge of the eye. Teeth small, closely set in wide villiform bands on intermaxillaries, mandibles, and palatines, in bunches on the basibranchials, and in a short, crescent-shaped band on the vomer. Eye nearly one fourth as long as the head, one and one fourth times in the snout, which in turn is three fifths of the interorbital space. A slender spine on the opercle above the base of the pectoral. Two short, compressed, rather blunt preopercular spines. Skin of head thin, covered with small scales, plainly showing the large mucous chambers in the skull beneath it. Pseudobranchiæ very small. Gill lamellæ very short. Six gill rakers and one rudiment on upper section of first gill arch, and eighteen rakers and six rudiments on the lower section; longest raker as long as the snout, slender. Gill membranes not united, not attached to the isthmus. Dorsal fin and anal continuous with the caudal, low. Dorsal origin above the pectoral base; anal origin distant from the snout two lengths of the head. Pectorals moderate, narrow, in the lower half of the depth of the body, three fourths as long as the head or longer, reaching to the vent or backward. Ventrals filamentary, of a single ray, half as long as the head, inserted immediately behind the humeral symphysis, bases close together. Caudal narrow, extending beyond dorsal and anal, pointed. Scales medium, thin, with fine concentric striæ, smooth to the touch, imbricated; those on head and snout smaller and irregular; seven large ones between the lateral line and the small ones on the base of the dorsal; about one hundred and ten between head and caudal. Lateral line becoming indistinct not far backward of the anal origin, rising little behind the opercle. A prominent anal papilla. Six short pyloric cæca. Skull with a prominent spine-like internarial keel, another in the interorbital region, and a third on the occipital crest. The ridge between the nostrils is not a spine, as in Lepophidium.

Blackish over body and head, also inside of mouth and body chambers.

Length eight and one half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3393	7° 15′ N.	79° 36′ W.	1020 fathoms	36.8° F.	Gn. M.

Bassozetus nasus sp. n.

Plate LXXVII. and Plate LXXVIII., Lat. Syst., Nerves, and Brain.

Br. r. 8 (8–7); D. 126–132; A. 105–109; V. 1; P. 23; C. 9; Ll. 156 ca.

Total length eleven, head and body cavity three and one eighth, head one and five eighths, and snout to dorsal fin one and one half inches. Body compressed; head thick, depressed anteriorly; caudal region slender, tapering regularly, threadlike toward the end. Greatest depth two thirds of the length of the head; outline highest and arched on the nape. Entire head covered with scales; skull with a high internarial ridge, and a ridge near each side of the interorbital space, separated by a deep concavity and diverging a little at each side of a similar cavity on the parietal region; muciferous cavities large and deep. Snout swollen, as broad as the orbital section, little longer than the eye, rather high and thick, with a median ridge and a prominence behind each nostril. Anterior nostril far forward, lateral, prominent, with a slight groove to the lip; posterior half way from the anterior to the eye. Eye lateral, small, one seventh as long as the head, one half as wide as the interorbital space, four fifths as long as the snout. Mouth oblique, large; maxillary reaching backward of the orbit one diameter of the eye, widened as much at the truncate extremity. Suborbital bones inflated over the maxillary. Teeth small, in villiform bands on intermaxillaries, mandibles, palatines, and vomer. Vomerine band forming an angle with the apex forward and extended down prominently from the roof of the mouth. No cranial spines; opercular spines weak and flexible, hidden in the skin. No pyloric cæca. Pseudobranchiæ very small, a pair of pinnules. Gill rakers two plus several rudiments on the upper half of the first arch and thirteen or fourteen plus three or four rudiments on the lower section; longest nearly as long as the eye. Scales small, thin, about twenty-seven in a series from the first ray of the anal to the dorsal. Ventrals close together, under the humeral symphysis, each reduced to a single threadlike segmented ray. Dorsal origin above the upper angle of the gill opening; origin of the anal not twice the length of the head from the end of the snout. Caudal slender, sharp pointed, nearly half as long as the head. Pectoral simple, small, hardly reaching as far back as to the vent.

Head, belly, and linings of mouth, gill chamber and body cavity black; fins light with black margins; muscular portions rusty brownish, no doubt darker before loss of scales. It may be that the muscular portions and the fins were reddish in life.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3415	14° 46′ N.	98° 40′ W.	1879 fathoms	36° F.	Br. M. glob. Oz.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 "	35.8° F.	Gn. M.
3360	6° 17′ N.	82° 5′ W.	1672 "	36.4° F.	Fne. bk. dk. gn. S.

Diplacanthopoma Jordani sp. n

Outlines resembling those of *D. brachysoma* Günther, with, perhaps, a little more elongation in the caudal region. Body compressed, high at the nape, tapering regularly to slender at the tail; greatest depth one fifth of the entire length. Head massive, one third of the total length, three fifths as deep and two fifths as wide as long, convex on the crown.

Bones of the skull thin and fragile, deeply excavated for the muciparous canals. Snout shorter than the orbit, depressed, broadly rounded at the end, prominent on the top forward of the nostrils. Mouth wide; lower jaw little if any longer than the upper; maxillary broadened and truncate at the end, reaching backward of the middle of the eye. Teeth small, in villiform bands on jaws and palatines and in a prominent V-shaped group on the vomer. Chin with a slight knob below the symphysis. Eye moderately large; orbit one fourth as long as the head, longer than the snout, in length equal to the width of the interorbital space. Preorbitals and suborbitals widely expanded; channels of the lateral system on the head wide and deep. Operculum with a medium sized spine on its hinder angle and another, of less prominence, directed downward from the lower corner. Gills four; lamellæ short; gill rakers comparatively few and short; gill openings wide; membranes hardly united, free from the isthmus. No pseudobranchiæ.

Vertical fins continuous; dorsal origin above the axil of the pectoral; caudal elongate, slender, pointed; pectorals somewhat broad; ventrals close together, each of a simple, slender, filamentary ray three fourths as long as the head.

Light olivaceous brown, probably yellowish in life, with scattered comparatively large puncticulations of black; inside of mouth whitish to yellowish; abdominal cavity lined with black; dorsal and anal with blackish margins; caudal blackish.

Named in honor of Professor D. S. Jordan, in token of a hearty appreciation of his work in North American Ichthyology.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3404	1° 3′ S.	89° 28′ W.	385 fathoms	43.2° F.	Rocky.

Bassogigas stelliferoides.

Neobythites stelliferoides Gilb., 1890, P. U. S. Mus., 112.
Bassogigas stelliferoides Jord. & Everm., 1898, Bull. 47, U. S. Mus., 2516.

Plate LXXX. fig. 1, Lat. Syst.

Br. r. 8; D. 96; A. 81–83; V. 1, bifid; P. 27–29; C. 8; Ll. 104, ca.; Ltr. 40, ca.

Head and body compressed, length and taper moderate; head four and three fourths times in the total length; depth four fifths of the length of the head. Crown very convex transversely and slightly so longitudinally. Snout short, less than two thirds as long as the eye, blunt, rather prominent above the midlength. Eye large, lateral, nearly twice as long as the snout, length equal to two thirds of the interorbital width. Nostrils at the side of the snout, rather close together, a short groove forward of the anterior at the lip. Mouth wide; maxillary extending backward of the eye about one third of the ocular diameter; lower jaw little longer. Teeth equal, in villiform bands on jaws, vomer and palatines. Vomerine band resembling a V, open backward and curved in arms and apex so that the latter is convex and the former are concave outwards. The strong opercular spine is the only spine on the head. Gills four, a slit behind the fourth. Gill rakers slender, longest three fourths as long as the eye, upper section of first arch with five and two rudiments and lower with thirteen and five rudiments. Gill membranes scarcely united, free from the isthmus. Pseudobranchiæ small. Vertical fins united. Dorsal origin above the base of the pectoral. Anal origin below the nineteenth ray of the dorsal. Caudal extending farther back than dorsal and anal, narrow, pointed. Pectorals simple, short, four fifths as long as the head. Ventrals filamentary, one fifth longer than the head, bases close together below the humeral symphysis; ray bifid, parts separate nearly to the base, outer reaching to the anal origin, inner longer and reaching to the tenth or twelfth ray of the anal. Snout to vent about one third of the total length. Pyloric cæca sixteen, of which there are several pairs below the intestine near the stomach. Scales very small, covering body and head. Lateral line distinct, near the dorsal fin, about eight scales distant, disappearing near the end of the tail.

Brownish; margins of fins darker or, with the greater portion of the caudal, blackish, the bases of dorsal and anal and the tip of the caudal being light. Belly and lower portions of head more or less silvery.

Length six inches and a half.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 fathoms	48.8° F.	Gn. M.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 “	55.8° F.	Gn. M.

HOLCOMYCTERONUS gen. n.

Closely allied to Neobythites, but differing in absence of preopercular spines, in ventrals and in pectorals. The body is compressed, high at the nape, and tapers to slender in the tail. Head massive, deeper than wide, convex on the crown, covered by scales. Snout short, broad, thick, blunt. Mouth large, anterior; intermaxillary forming the upper border. Teeth small, equal, very numerous, in wide villiform bands on jaws, vomer, palatines, basibranchials, and pharyngeals. Nostrils small, lateral, in front of the eye, with a groove, in which there are sensory papillæ, from the hinder part of the anterior nostril down and forward to the lip. Eyes small, lateral, without an orbital fold. A large, strong, horizontally directed opercular spine; no other spines on the head. Gill openings wide; membranes not united, free from the isthmus. Gills four, a slit behind the fourth; laminæ short; rakers well developed, numerous. Pseudobranchiæ small. Branchiostegal rays eight. An air bladder. Pectoral fins intermediate in form between those of Neobythites and those of Dicrolene, some of the lower rays being free for a considerable portion of the length. Ventrals small, a short distance apart, at the humeral symphysis, each composed of two distinct rays. Vertical fins united; dorsal and anal very long; caudal narrow. Scales small, thin. Lateral line rudimentary or absent.

Holcomycteronus digittatus sp. n.

Plate XXXVI. fig. 1; Plate LXXVI. fig. 2, Lat. Syst.

Br. r. 8; D. 105–121; A. 89–106; V. 2; P. 16–17; C. 8; Ll. 129–147; Ltr. 15 + 21.

In the specimen described the total length is fourteen inches; the depth of the body or the length of the head is about one sixth of the total. Form stout, massive anteriorly, compressed, tapering regularly to become very slender near the caudal fin. Head broad, depressed, crown convex, nape high. Snout broad, blunt, two and one half times as long as the eye, like the balance of the head covered with scales. Mouth large, wide, anterior; jaws nearly equal, lower included. Intermaxillary separating the maxillary from the edge of the mouth. Maxillaries long, reaching one diameter of the eye farther backward than the orbit, scaly in the posterior half, broader than the eye at the hind extremity. Teeth small, equal, in broad villiform bands on jaws, palatines, vomer, and basibranchials. Palatine and basibranchial bands wide; vomerine broadly V-shaped with the branches backward and somewhat curved outwards. Eye small, two and one half times in the length of the snout, three and one half times in the width of the interorbital space, one ninth as long as the head, or one half of the distance from the mouth. Nostrils small, anterior near the end of the snout, with a groove containing sensory papillæ from the hinder part of its valve down and forward to the intermaxillary; posterior distant from the eye less than one diameter from the front of the orbit. Opercular spine large, strong; no other spines on the head. The lower angle of the operculum is spine-like, but is not free and is hidden by the skin. Gill membranes united for a short distance, free from the isthmus. Gills four, a slit behind the fourth. Gill rakers slender, elongate, longest as long as the eye, eight developed on the first arch which also bears five or six rudiments at each end of the series. Pseudobranchiæ very small. Air bladder large. Dorsal origin little backward of the axil of the pectoral, height in midlength equal to the length of the snout. Snout to anal fin two and one third times the length of the head. Vertical fins united, bases thick and covered by scales. Caudal narrow, pointed, nearly half as long as the head. Pectorals as long as the head, very flexible, with five or six of the lower rays free for about half of their length, resembling in a measure Dicrolene or Pteroidonus, but the free extremities are not produced backward of the other rays of the fin. Ventrals small, longer than the snout, less than one diameter of the eye apart, below the humeral symphysis; each fin composed of two rays, separated to their bases, and varying from somewhat inflated and blunt to acuminate or filamentary at the ends. Scales small, thin, flexible, concentrically striate; also with radiating striæ, many of which do not reach the centre of the scale, and with the spaces between the striæ reticulated. Lateral line apparently irregular, traced as far as to the origin of the anal.

Fins, lower parts of head, gill membranes, and linings of mouth and body cavity black; muscular portions lighter, possibly tinted with purple in life; top and sides of head whitish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3434	25° 29′ 30″ N.	109° 48′ W.	1588 fathoms	36.4° F.	Br. M. bk Sp.
3374	2° 35′ N.	83° 53′ W.	1823 "	36.4° F.	Gn. Oz.
3375	2° 34′ N.	82° 29′ W.	1201 "	36.6° F.	Gy. glob. Oz.
3414	10° 14′ N.	96° 28′ W.	2232 "	35.8° F.	Gn. M.
3415	14° 46′ N.	98° 40′ W.	1879 "	36° F.	Br. M. glob. Oz.

Eretmichthys gen. n.

In general appearance resembling Bassozetus. Body compressed, tapering from the head, elongate and slender in the caudal region. Head higher than wide, thick, convex on the crown, broad at the snout. Snout broad, blunt, not projecting beyond the mouth. Bones of skull thin, with large mucous cavities, prominent in the internarial region. Mouth large, upper border formed by the intermaxillaries. Teeth small, in villiform bands on intermaxillaries, lower jaws, vomer, and palatines. Branchiostegal rays eight. Nostrils rather close together, prominent; a groove from the anterior nostril down and forward to the lip. Eye small, lateral. Gill openings wide; membranes not united, free from the isthmus. Four gills, a slit behind the fourth; rakers numerous, elongate, slender. Pseudobranchiæ small. No barbels. Opercles thin, margins flexible, spine weak. Preopercle not armed. Vertical fins united; dorsal origin close to the head; caudal narrow, elongate, pointed. Ventrals of a single filamentary ray, close together, at the humeral symphysis. Pectoral bases broad; lower half of the fin longer, in the type species very long and rigid, forming a long oarlike sweep, the function of which may be of sexual rather than of motor importance. Scales thin, deciduous, covering body and head.

Eretmichthys pinnatus sp. n.

Plate XXXV. figs. 1–4; Plate LXXIX. fig. 2, Lat. Syst.

Br. r. 8; D. 125–128; A. 104–105; V. 1; P. 29 (14 + 15); C. 8.

Elongate, slender, compressed, tapering; depth two thirds of the head length. Head two elevenths of the total length, high at the nape, very convex across the forehead, prominent between the nostrils on the top of the snout. Snout broad, blunt, deep, more than twice as long as the eye. Mouth wide, little higher forward; cleft subtending the entire eye; maxillary reaching a vertical one diameter of the orbit farther back, broadened and indented at the end, lower angle longer, acute. Teeth small, equal, in villiform bands on jaws, vomer, and palatines. Vomerine band V-shaped, with apex forward and descending and with arms curving out toward the palatines. A groove from the anterior nostril to the lip. Eye small, nearly half as long as the snout, one third of the interorbital space, one tenth of the head. Gill openings wide; membranes not united, free from the isthmus. Branchiostegal rays eight. Gills four, a short opening behind the fourth; laminæ short; rakers slender, as long as the orbit, fifteen to seventeen in number, only one or two of which are on the upper section of the arch. Pseudobranchiæ small. Tongue acute, free at the end. Opercular margins thin flexible. Opercular spine weak; no other spines on the head. No barbels. Occipital and internarial crests of the skull moderately prominent. Genital papilla small. Vertical fins united; dorsal origin on the nape, forward of the upper angle of the gill opening. Anal origin distant from the head less than the length of the latter, below the twenty-fifth ray of the dorsal. Ventrals of a single filamentary ray, two thirds as long as the head, close together, at the humeral symphysis, below the hind ends of the gills. Pectorals wide at the base, flexible in the upper half, which is two thirds as long as the head, rigid in the lower section, which is twice as long as the upper portion and in which the rays are firmly joined in the basal half but flexible, spreading, and connected by membrane in the distal moiety. Upper section of pectoral with fifteen, and lower with fourteen or fifteen rays. Caudal narrow, elongate, less than half as long as the head, acuminate. Scales small, thin, deciduous. Distance from bases of ventrals to vent nearly one and one fourth times the length of the head.

Blackish or brown; muscular portions somewhat lighter, rusty; linings of mouth and body cavity black. Top and sides of head whitish; probably the mucous sacs, which cover these areas, are light producers.

Seventeen inches in total length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3363	5° 43′ N.	85° 50′ W.	978 fathoms	37.5° F.	Wh. glob. Oz.
3366	5° 30′ N.	86° 45′ W.	1067 "	37° F.	Yl. glob. Oz.
3400	0° 36′ S.	86° 46′ W.	1322 "	36° F.	Lt. gy. glob. Oz.

Eretmichthys ocella sp. n.

Plate XXXVII. fig. 1; Plate LXXIX. fig. 1, Lat. Syst.

Br. r. 8 (8–7); D. 121–123; A. 97–100; V. 1; P. 28; C. 8.

Shaped much like *E. pinnatus*, but differing in numbers of fin rays and in form of pectoral fins. Body and head compressed, depth about one seventh of the total length. Head less than half as wide as long, one fifth of the total length, high at the nape, prominent on the internarial region, convex across the forehead, with strong occipital crest on the skull. Snout large, broad, thick, bluntly rounded at the end, high at the nostrils and above the middle, more than twice as long as the eye. Mouth wide, somewhat oblique; maxillary nearly half as long as the head, dilated posteriorly to one and one half times the width of the eye, lower angle acute, midlength nearly below the middle of the orbit. Teeth small in villiform bands on jaws, vomer, and palatines. Vomerine band V-shaped, with the branches curving out and backward toward the palatines and the apex descending forward and expanded into a rather broad patch. Eye very small, two fifths as long as the snout, two sevenths of the interorbital space, one eleventh of the length of the head. Nostrils prominent; posterior higher than the eye, its distance from the orbit equal that from one another or that from the anterior to the intermaxillary; a groove from the anterior to the lip. Opercular spine weak, flexible; preopercle not armed. No barbels. Gill openings wide; membranes not united, free from the isthmus. Pseudobranchiæ small. Genital papilla small. Vertical fins united; dorsal origin forward of the bases of the pectorals; anal origin less than the length of the head behind the latter; caudal narrow, elongate, acute, united at the base with dorsal and anal. Pectoral base wide, about one third of the length of the fin; lower section of the fin longest, flexible, pointed. Ventrals close together, at the humeral symphysis, each a single, segmented filamentary ray, two thirds as long as the head.

About fifteen inches in total length.

Fins, mouth, throat, gill membranes, and linings of mouth and body cavity black. Body over the muscular portions brownish, possibly reddish or purplish in life. Top and sides of head, over the very extensive mucous cavities whitish, possibly light producing in the living animal.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard.

CATAETYX.

Cataetyx Günt., 1887, "Challenger" Report, Deep Sea Fishes, 104.

Form somewhat resembling that of Diplacanthopoma. Body elongate compressed; scales small; lateral line distinct. Head elongate; depressed; cheeks scaly. Eye small, superior. Mouth wide, anterior, intermaxillary alone forming the upper margin. Teeth small, equal, in villiform bands on jaws, vomer, and palatines. Snout broad, blunt, lower jaw longer. No barbels. A long opercular spine. Gills four, a slit behind the fourth; laminæ short; membranes not united, free from the isthmus; apertures wide; rakers few. Branchiostegal rays nine to eight. Pseudobranchiæ small, said to be absent in the typical species. Vertical fins united. Ventrals close together, behind the humeral symphysis, forward of the pectorals, of a single filamentary ray. Vent far behind the ventrals. Male with a genital cage, behind the anal aperture, enclosing a prominent anal papilla. Pyloric appendages few.

The species described immediately below appears to belong to this genus, though slight changes in the characterization are necessary to admit it.

Cataetyx simus sp. n.

Plate E, fig. 2; Plate XXXIX. figs. 3–6; Plate LXXX. fig. 2, Lat. Syst.

Br. r. 9–8; D. 91–99; A. 71–77; V. 1; P. 25; C. 10; Ll. ca. 255; A. to D. ca. 40.

Compressed, but thick above the body chamber, tapering to slender near the end of the tail, depth nearly two thirds of the length of the head. Body cavity somewhat more than half of the total length. Head long, one fourth of the total without the caudal, or three thirteenths of the entire length, wider than high in the posterior half, much wider than deep at the eyes and forward, outline of top concave longitudinally or broadly convex from cheek to cheek. Interorbital width equal to length of orbit. Snout twice as long as the eye, twice as wide as deep, very broad and bluntly rounded as seen from above, and slightly bent upward as viewed from the side. Mouth very wide; cleft subtending the anterior portion of the orbit; maxillary subtending the entire orbit and equalling it in width at the end, where the lower angle is a right one while the upper is prolonged and acute with a blunted apex. Teeth equal, small, in villiform bands on jaws, vomer and palatines. Vomerine band V-shaped, the angle forward and much curved downward into the mouth. Eye small, half as long as the snout, its length equal to the width of the interorbital space, one eighth of the length of the head, directed obliquely out and upward. Anterior nostril tubular, over the maxillary; posterior half way from the anterior to the eye. Gill openings wide; membranes not united, free from the isthmus. Gills four, a slit behind the fourth. Three short, compressed gill rakers developed on the first arch. Branchiostegal rays nine to eight. Pseudobranchiæ small. Opercular spine horizontal, as long as the snout, strong, the only spine on the head. Bones firm; occipital crest moderate; a low internarial prominence. Genital cage, or niche, firm cartilaginous, longer than the orbit, with a median keel below, folding upward against the first anal ray, posteriorly (superiorly) with a large tri- or quadrangular opening within which the genital papilla is located, Plate XXXIX., figs. 3–6. The anal aperture is immediately in front of the cage. The papilla when at rest is directed upward against the body. When the cage is bent downward the papilla is directed horizontally backward, or possibly downward when in function. Dorsal origin near midway from base of pectoral to vent; anal origin below the twenty-fifth ray of the dorsal. Pectorals short, two fifths as long as the head, bases deep. Ventrals close together, little backward of the humeral symphysis, of a single filamentary ray, as long as the pectoral. Vertical fins confluent; caudal narrow, median rays longer, one third as long as the head or longer. Pyloric appendages two, comparatively short and thick Mucous cavities and pores large. Scales absent from head on the top, snout and below, present on the sides. Lateral line distinct, parallel with the dorsal to a point below the fifteenth ray or thereabout, thence descending to the middle of the flank to continue to the tail. The viscera are figured on Plate XXXIX. (fig. 3).

Brownish, uniform or tinted with olivaceous or reddish.

Nineteen inches in total length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3361	6° 10′ N.	83° 6′ W.	1471 fathoms	36.6° F.	Gn. Oz.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 "	36.4° F.	Hard.
3400	0° 36′ S.	86° 46′ W.	1322 "	36° F.	Lt gy. glob. Oz.

PSEUDONUS gen. n.

Shape in a measure resembling that of Porogadus; body compressed and tapering; body cavity about half of the total length. Head medium, like that of Mixonus in some respects, but more elongate. Mouth wide, upper jaw projecting very little. Teeth in villiform bands on jaws, vomer and palatines. Eight branchiostegal rays. Gill openings wide; membranes hardly united, free from the isthmus. No pseudobranchiæ. No barbels. No ventrals. Vertical fins united. An opercular spine. Channels of the lateral canal system greatly developed on the head.

Pseudonus acutus sp. n.

Plate XXXIX. fig. 1.

Br. r. 8; D. 109; A. 81; V. 0; P. 21; C. 10; Ll. 77; Ltr. 27; D. to A. 19.

Moderately compressed; depth near one seventh of the total length, body chamber not far from one half. Head elongate, about as wide as deep, tapering slightly forward, nearly one fourth of the entire length including the caudal fin. Snout longer than the eye, the length being twice that of the interorbital space, somewhat broad, blunt. Mouth wide, lower jaw shorter than the upper, maxillary reaching nearly half the length of the head, broad and truncate posteriorly. Teeth small, in villiform bands on the jaws, vomer, and palatines. Vomer decurved in front, bringing the curved band of teeth prominently down on the roof of the mouth. Eyes large, about one sixth as long as the head, shorter than the snout, superolateral, in length twice the width of the interorbital space. Nostrils distant from one another, posterior nearer to the eye than to the end of the snout, anterior near the lip in front. First branchial arch with two rudimentary rakers on the upper section, and three short compressed ones and half a dozen rudiments on the lower branch. Gill openings very wide; membranes little if any united, free from the isthmus; laminæ very short. No pseudobranchiæ. A strong opercular spine, as long as the orbit; no other spines on the head. The distance from the snout to the mandibular angle is equal to that from the eye to the end of the opercular spine. Skull deeply excavated for the muciparous channels. Dorsal and anal fins united with the slender caudal. The distance from the occiput to the origin of the dorsal, midway between the pectorals and the vent, is equal to that from the occiput to the end of the snout. Anal fin originating slightly behind the middle of the total length, below the twenty-ninth ray of the dorsal. No ventrals. Pectorals simple, not wide, half as long as the head. No pyloric appendages. Lateral line faintly indicated on the forward portion of the body. Scales small, very thin and flexible.

Brownish; head lighter; fins light; belly and gill chamber blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3407	0° 4′ S.	90° 24′ 30″ W.	885 fathoms	37.2° F.	Glob. Oz.

Acanthonus spinifer sp. n.

Plate F, figs. 3, 3 a.

Br. r. 8; D. 101; A. 91; V. 2; P. 16; C. 8.

Head large, thick, high, two sevenths of the total length. Snout to anal fin about one third of the total. Body cavity short, not half as long as the head. Behind the cavity the caudal section is much compressed and tapering. Cephalic spines situated as in *A. armatus;* the spine at the upper angle of the opercle is slender and about half as long as the head; those on the preopercle are shorter, the uppermost being the longest of the three and the lowest the least developed. The angle at the end of each lower jaw is a spinelike prominence. Nape high, arched; a slight concavity on the crown. Snout massive, broad, more than twice as long as the eye, surmounted by a pair of sharp horizontally extended spines, Plate F, fig. 3 a. Eye lateral, small, less than half as long as the snout, less than one seventh as long as the head, nearly one third as wide as the interorbital space. Mouth wide; the cleft slightly rising forwards; maxillary nearly half as long as the head, reaching a considerable distance farther back than the orbit; lower jaws shorter, included. Teeth small, not very close together, in villiform bands on jaws, vomer, and palatines. Nostrils lateral. Bones of the skull soft, with large mucous cavities. Gill openings wide; membranes not united, free from the isthmus. Gill rakers short, slender; lamellæ very short. No pseudobranchiæ. Origin of the dorsal above the bases of the pectorals, preceded in the specimen described by a couple of rudimentary spines. Anal origin below the eleventh or twelfth ray of the dorsal. A space at the caudal separating it from dorsal and anal was probably traversed by membranes uniting it with these fins. Ventral bases below the eye, fins each with two slender filamentary rays, the longer of which reaches quite to the vent. Vent below the middle of the pectoral fin. Existence of scales a matter of some doubt. Lateral line not apparent.

Top of the head to below the eye whitish; mouth, chin and body chamber black; from the origins of dorsal and anal backward cloudy brownish.

The shape in this species is similar to that of *A. armatus*, the differences appear in the branchiostegal rays, the ventrals, the scales and the lateral line.

Total length hardly more than three inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 fathoms	35.8° F.	Gn. M.

SCIADONUS gen. n.

Compressed and elongate in form; head massive, snout blunt. No eyes. Gill membranes free from the isthmus. Gill lamellæ very short. Branchiostegal rays seven. Vertical fins united at their bases. Pectorals pedicellate, narrow, long. Ventrals filamentary, small, of a single ray, close together, below the humeral symphysis. No cephalic spines. Opercles membranous. Teeth small, in villiform bands. Body cavity long; vent far from the head. Forehead occupied by a mass of mucus, possibly light producing. Bones of the skull thin, soft.

Sciadonus pedicellaris sp. n.

Plate F, fig. 4.

Br. r. 7; D. 89; A. 47; V. 1; P. 12; C. 6.

Body elongate, compressed, the chamber reaching more than half of the total length. Head massive, high, thick, blunt at the snout, strongly convex on the internarial region. Eyes absent; a faint whitish spot in the positions they should occupy is the only trace. Nape high. Chin prominent, with a bulb or cushion at the symphysis. Mouth wide; maxillary much widened posteriorly, truncate, half as long as the head. Teeth small, in villiform bands. Nostrils lateral; anterior with a short tube; posterior larger. Gill openings wide; membranes not united, free from the isthmus; lamellæ very short, hardly longer than the rakers, which are nearly as wide as long. Dorsal origin scarcely the length of the head behind the latter. Anal origin below the forty-third ray of the dorsal, or thereabout, nearly midway from the head to the end of the caudal. Dorsal and anal united with the caudal base. Bases of the pectorals long slender pedicels, nearly as long as the maxillary, half as long as the fin, which is elongate, slender, pointed and almost as long as the head. The structure of the pectorals with the absence of the eye suggests a dependence upon them as tactile organs, in addition to their function as balancers. Ventrals small, of a single ray, close together, below the humeral symphysis, less than one fourth as long as the head. Caudal small, extending beyond dorsal and anal, to which it is united by membranes, of six long rays, median longest. The entire forehead is filled with mucus, which possibly may be utilized in the production of light.

The colors of a fresh specimen were whitish, somewhat translucent with the eggs in the ovaries orange or red, showing through the body walls.

Total length four and one eighth inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3365	5° 31′ N.	86° 31′ W.	1010 fathoms	37° F.	Yl. glob. Oz.

LAMPROGRAMMUS.

Lamprogrammus Alcock, 1891, Ann. Mag., VIII., 34.

Outlines resembling those of other Brotuloids. Head and body greatly compressed, the latter tapering to very slender backward; body cavity less than one half of the total length. Skull narrow, deep, convex on the top; snout broad, blunt. Mouth large, somewhat oblique, lower jaw little longer. Teeth in villiform bands on jaws, vomer, and palatines. Nostrils small; posterior near the front edge of the upper half of the eye and anterior directly forward near the end of the snout. No barbels. Four gills, a slit behind the fourth; laminæ short; gill rakers well developed; gill openings wide, membranes not united, free from the isthmus. No pseudobranchiæ. Bones of the skull thin with prominent ridges separating the wide and deep muciparous channels. Opercular spine weak; a much weaker and blunter one on the lower edge of the preopercle. Vertical fins continuous; dorsal origin near the head on the nape. Pectorals small, simple. No ventrals. Vent remote from the pectorals. Pyloric appendages few and short. Head and body covered with small, thin, deciduous scales, those protecting the lateral system rather smaller. Lateral line wide, covered by the skin and scales, probably luminous. Disks of the lateral system vertically elongate, each resting on a large scale that is wider than long.

The figures and description of *Lamprogrammus niger*, published by Alcock, and copied by Goode and Bean, give a very imperfect idea of the lateral system as it appears on the species described below. They show the line organs as they would appear on the flanks after the removal of the outer scales and skin, if the intermediate scales and spaces of the series and the longitudinal white line connecting one gland with another were omitted. The arrangement of the system on the head is described below and is figured on Plates XXXIV. and LXXXI., fig. 1. Of the three known species of the genus two were taken by the "Investigator," one of them in the Andaman Sea the other in the Bay of Bengal; the third is first made known by the present "Albatross" collection and was taken in the Gulf of Panama. All were secured at depths between 400 and 700 fathoms.

Lamprogrammus illustris sp. n.

Plate XXXIV., Plate LXXXI. fig. 1, Lat. Syst.

Br. r. 8; D. 112; A. 88; V. 0; P. 16–18; C. 9; Ll. ca. 110.

Brotuliform, much compressed in body and head, less than half as wide as deep. Depth equal to the length of the head or to one fifth of the total length. Body chamber one third of the total. Head as deep as long, covered by thin scales and by mucous channels under the skin in which occur luminous organs similar to those of the lateral system on the body except in resting on the bones of the skull rather than upon modified scales. Skull deeply excavated for the muciparous canals. Snout more than twice as long as the eye, broad, blunt, prominent on the upper ends of the intermaxillaries, more prominent below the symphysis of the lower jaws; chin prominent, angular. Mouth large, oblique, cavernous; cleft extending below the entire eye; maxillary separated from the cleft by the premaxilla and reaching one half diameter of the orbit farther back, wider than the eye, lower edge nearly straight, upper and hinder edges concave, angles rounded off, three sevenths as long as the head, thin toward the extremity. Teeth small, in villiform bands on the jaws, in a narrow regularly V-shaped band on the vomer, and in short and narrow bands on the palatines. Orbit small, lateral, length one half of that of the snout, one third of the width of the interorbital space, less than one eighth of the length of the head; orbital bones prominent. Nostrils small; posterior near the front of the upper edge of the eye; anterior more than half way from the posterior to the end of the snout. Suborbital bones much expanded downward over the maxillaries. Gill openings wide; membranes not united, free from the very narrow isthmus. Gills four, a slit behind the fourth; laminæ short; rakers slender, longest as long as the eye, first series of five on the upper section of the arch and fourteen on the lower, decreasing in size to rudiments at each end of the series. No pseudobranchiæ. A deep cavity extending forward into the head from the upper end of the first branchial arch. A moderately large glandular structure, in the shape of a compressed ring, Plate XXXIV. fig. 6, immediately forward of the scapula at the forward end of the luminous system of the body, between the latter and that of the head, under the operculum and above the gills, supported behind by short swollen ribs from the first and the second vertebræ.

Lateral line as wide as the orbit, extending back on about eighty scales to a point below the seventy-fifth dorsal ray. It might be described as apparently composed of two systems; the ordinary one below and through the scales, and a luminous system outwardly resembling a dermal tube covered by about eight series of smaller very thin scales and applied to the outside of a couple of series of the larger scales of the flank two or two and one half scales from the base of the dorsal fin. This tube, Plate XXXIV. fig. 4, contains mucus and against its inner wall a series of narrow, spindle shaped, vertically placed, glandular light or flash organs, Plate XXXIV. figs. 1, 3, 4, 5, connected with one another by a fine nerve-like strand of tissue. Each of the luminous organs is fusiform, somewhat flattened, tapering at each end and enlarged in the middle, where it contains an elliptical or rounded body, disk or facet, of different structure, Plate XXXIV. fig. 5. From each end of the spindle the tissue appears to be reflected around the wall of the tube over the gland so as to form a complete ring. While the skin and scales covering the structures present a black appearance in the collapsed condition both are so thin as to offer little obstruction to the passage of light when the tube is distended by mucus. On *Lamprogrammus niger*, Alcock, 1891, Ann. Mag. N. H., VIII., 34, describes loopholes over the glands; no such openings are to be seen on the present species. The pores in places appear to open along the lower edge of the tube away from the organs. Each organ of the series rests on a large scale twice as wide as those at each side of it and separated from similar organ-bearing scales by a pair of the ordinary scales of the flank, half as large, Plate XXXIV. fig. 4. Thus the light organs on this species are not on contiguous scales, as figured on *L. niger*, in the Annals and Magazine, 1891, VIII., p. 33, or in the Illustrations of the Zoology of the "Investigator," 1892, Plate I. fig. 2; the differences will be prominently shown by comparison of the mentioned illustrations with Plate XXXIV. of the present work. It is most likely that the large scale bearing the spindle was originally an ordinary small scale which has so enlarged as to cover its neighbors in the next series. The body between the lateral systems of the two sides is thinner than either above or below them; this gives rise to the groove-like depressions occupied by the lines. Behind the line on the tail the groove disappears and the squamation is irregular. The luminous system originated on the head and gradually extended backward over the body; the arrangements of the scales are sufficient evidence that it is a later development.

Over the head the mucous and luminous systems are peculiarly distributed. In some measure their arrangement recalls that seen in the cephalic canals of the lateral system on certain Selachia ("On the Lateral Canal System of the Selachia and Holocephala," 1888, and Plate LXX., below). While the structures in these cases are very different the resemblances in locations are sufficiently close to permit the use of similar terms in description. The cephalic canals are tortuous and the fusiform disks, being transverse, are not as on the body vertical to the general axis, but are directed toward all points. On the top of the head two rostral series converge backward from the foremost of the glandular spindles until near the interorbital space where they become divergent and, as cranials, traverse the space to the frontal region behind it, on reaching which each branches to send one branch inward nearer the median line of the crown and another out to pass backward nearer its edge. At the back of the skull each of the inner branches turns outward and passing down and backward reaches the hindmost organ of the cephalic series on the post-temporal (scapula). In each of the cranial series there are eleven of the glandular bodies. From the outer branch of each cranial the orbital and the suborbital series, of seven glands, passes down behind the eye and forward below it. Farther back from the end of the outer cranial branch there is a short occipital thread without spindles connecting the outer with the inner branch, and an opercular series extends down on the preopercle and then continues forward, as the oral, under the lower jaw. No aural connection was to be traced. Between the cranial and the mandibular symphysis there are nine of the luminous disks. On each side of the head there are twenty-five of the glandular spindles, which with the forty on each side of the body make one hundred and thirty in all. It is difficult from the material at hand to determine the connection between the series on the head and those on the body; the thread connecting one gland with another disappears on the post-temporal and reappears again at the first spindle on the body. Whether the thread is continuous, as is to be expected, is still problematical. Immediately behind the head the thin scale-covered black skin extends down along the shoulder girdle to the abdomen. Beneath this skin above the pectoral the large scales appear to be isolated and each to lie at the bottom of a sac surrounded by membranes that are attached at the edges or between the scales. Bits of what may have been coagulated mucus occur in some of the sacs; unless they have been greatly macerated the structures are hardly like those of the disks in the lateral line.

The descriptions of *L. niger* and of *L. fragilis*, the other known species of the genus, do not inform us of the possession of either glandular spindles or the annular gland on the head. It is not at all likely, however, that these species differ from *L. illustris* in regard to the particular features of the head while agreeing so closely with it in other respects. The original description of the lateral line of *L. niger*, Ann. Mag. N. H., (6) VIII., 34, is as follows: "The scales of the very conspicuous lateral line are adherent and greatly enlarged; they lie beneath a continuous sheath of black skin, which is loopholed over a long narrow groove with raised margins situated along the vertical diameter of each scale. These grooves are filled with an opaque white substance, which probably has a luminous function. The lateral line, in fact, is exactly similar to that of several species of *Halosaurus*." On the species secured by the "Albatross" the black skin is continuous and covered by small scales, there are apparently no loopholes over the glands, and no grooves along the vertical diameter of each scale, and in various ways the structure of the line differs considerably from that of the Halosauri, as is shown in the description and in the figures on Plate XXXIV.

The skull presents no very great differences when compared with that of other Brotuloids, Plate XXXIV. fig. 2. Its bones are thin and fragile, and are much excavated for the channels of the lateral system. The lower jaw is short and very deep posteriorly, the depth being more than half of the length. Preorbitals and suborbitals bear considerable expansions. The operculum is much reduced in size. The occipital crest is prominent at the nape and is continued downward on the back of the skull in a comparatively wide compressed ridge in front of the spine on the anterior vertebra. In the bases of the pectorals the elongation of the carpals is not to be compared with what is seen in Sciadonus.

This species was obtained by the "Albatross" at two localities, both of them within the Gulf of Panama.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.
3394	7° 21′ N.	79° 35′ W.	511 "	41.8° F.	Dk. gn. M.

GADOIDS.

The specimens upon which this report is made establish the presence of the Gadoids at considerable depths in the equatorial regions of the eastern Pacific. They represent more than one third of the genera positively known to be from the deep sea, that is from below a hundred and fifty fathoms. Among them are two genera, Microlepidium and Leptophycis, that do not readily identify with any of those previously known; there is a new species of Læmonema that is perhaps as closely allied to *L. melanurum* G. B., as to any other of the genus; there is a new form of Antimora, so closely allied to *A. rostrata* Günt. from the far south, to *A. viola* G. B., from the northwestern Atlantic and to *A. microlepis* Bean from the northeastern Pacific as to raise the question whether the four are not to be ranked as varieties of the species *A. rostrata;* there is a new Merluccius that is more nearly allied to *M. Gayi* Guich. off the coasts of Chili than to *M. bilinearis* Mitch. or *M. merluccius* Linn., ; there are two species of Phyciculus, one of them new and closely allied to *P. nematopus* Gilb., from off the coasts of Lower California, and somewhat less so to *P. fulvus* Bean, from the Caribbean Sea and the Gulf of Mexico; and there is a new type of Bregmaceros, *B. longipes*, quite distinct from that of the western Pacific and the Indian Ocean, *B. Macclellandii* Thomps., and more closely akin to *B. atlanticus* G. B., from the Caribbean Sea.

The bathybial portion of the group has a much greater horizontal distribution than the shoal water portion; while the latter is mainly included in the temperate regions the former extends beyond them under the tropical seas and to the polar regions. In the frigid zones the known representation is small, probably because almost nothing has been done toward the determination of the fauna in those latitudes. The principal migrations of the Gadoids appear to be from the deeper to the shoaler waters and back, of a considerable vertical but not of a very great horizontal extent. So far as determined the vertical range is less than that of a number of the other groups. Only one of the Gadoids yet discovered has been taken from below 1500 fathoms; Melanonus as noted by Günther in the "Challenger" report, is from 1975. The nearest approaches to this are Læmonema, from 1467, Antimora, from 1434, and Gaidropsarus, from 1246 fathoms.

Concerning affinities between the Gadoids of the Atlantic and those of the Pacific, in the shoal water genera, Gadus, Merluccius, etc., they apparently are closer by way of polar waters, while in the larger proportion of the deep sea types, as Antimora, Læmonema, Phyciculus, and others, the connections appear closer by way of the isthmus. Moderately close allies occur on opposite sides of the Pacific, in Lepidion and in Phyciculus for instances.

The amount of specializing modification undergone by bathybial Gadoids is less comparatively than that seen in groups like the Pediculates or even the Brotuloids. Special light producing organs have not yet been discovered; though probably the lateral system is more or less luminous in a number of the genera. No species deprived of sight are known as yet; the eye generally is large and well developed. Such modifications as exist are most apparent in the lateral system and in its surroundings on the skull, where the changes do not differ in any noticeable extent or character from those obtaining on most other deep sea fishes, except perhaps in case of *Phycis regius* Walb., on which the aural and the occipital portions of the system are considerably differentiated, in connection with electric functions, this being the species capable of giving off a very perceptible discharge as recorded by Prof. A. Agassiz, 1888, in the Three Cruises of the "Blake," II., p. 23. The system in this species and others of the group has been worked out as far as was possible from the alcoholic specimens and is figured on Plate LXXXI. fig. 2, Plate LXXXII., and Plate LXXXIII. fig. 1. Filamentary developments no doubt serving as tactile organs occur on many species, but neither in such extent nor condition as should serve to separate the Gadoid much from other deep sea forms, or, for that matter, from various pelagic or shoal water species.

The specimens in this collection were generally taken from localities in which the bottom was muddy and in temperatures the average of which is about 48.2 degrees Fahrenheit, or of which the recorded extremes were 57.3 degrees and 36.8. The greatest range noted for a single species is that of *Phyciculus longipes*, 56.2 to 39 degrees, which species ranged vertically from the 127th fathom to the 695th. This range in depth is much exceeded in the group by species of the northwestern Atlantic, *Antimora viola* G. B., from a depth of 306 to one of 1434 fathoms and *Lœmonema melanurum* G. B., taken at a depth of 208 fathoms and downward to that of 1437, which gives these species vertical ranges of 1128 and 1259 fathoms respectively, the greatest in the family and each more than a mile. In the case of these fishes as in that of others it is very evident that of the two, temperature and pressure, it is temperature and not pressure that is the determining factor in vertical distribution. This is shown by *Antimora viola* captured by the steamer "Albatross" at some thirty different stations for which both depth and temperature of the bottom are given. The depths vary more than a thousand fathoms while the temperatures corresponding to them all lie between 37.3 and 40 degrees Fahrenheit, averaging about 38.8 degrees. The variation in the temperatures of the different stations is remarkably small but that in the pressures at the widely different depths is enormous.

GADIDÆ.

MICROLEPIDIUM gen. n.

Form more compressed, deeper and more massive in the forward half than that of Lepidion, tapering to very slender backward; body cavity less than half of the total; body and head covered with small scales. Mouth large, oblique, lower jaw longer. Teeth in villiform bands on the jaws, stronger and in a V-shaped single series on the vomer, none on the palatines. Eyes large, lateral. Branchiostegal rays seven. Gills four, a slit behind the fourth; rakers numerous, long, slender. Gill openings wide; membranes united, free from the isthmus. Pseudobranchiæ present. No barbel. Two dorsal fins; anterior small, of eight rays. One anal fin; caudal narrow, distinct; pectorals small, elongate; ventrals long, narrow, apparently of a single bifid ray, but really of two rays closely bound together and with rudiments of a couple of others. Pyloric cæca.

Microlepidium differs from Lepidion in having the lower jaw longer than the upper, in having a longer first dorsal of eight rays instead of four, in having the dorsals hardly separated, in having ventrals of four rays instead of six, in having a less distinct lateral line, and in having a much larger number of pyloric appendages.

Of the two known species of this genus, one, *M. verecundum, Lepidion verecundum,* Gilb., 1896, P. U. S. Mus., 456, has the maxillary reaching to below the front of the pupil, "a stiffish pointed projection representing the barbel" on the end of the lower jaw, no spines on snout or opercles, ventrals half as long and pectorals about half as long as the head, an anal of thirty-seven rays and deeply notched behind the middle, and has about seventy-five scales in a longitudinal series; while that described below has the maxillary subtending more than half of the eye, has no projection on the chin, has a moderately strong spine on the operculum, has ventrals a little longer than the head, has pectorals more than two-thirds as long as the head, has an anal of forty rays hardly notched near the middle, and has about one hundred and fourteen scales in a longitudinal series. *M. verecundum* was obtained by the "Albatross," near the Revilla Gigedos, off the Coast of Mexico, in a depth of 364 fathoms

Microlepidium grandiceps sp. n.

Plate XLIII. fig. 1–5; Plate LXXXIII. fig. 1, Lat. Syst.

Br. r. 7; D. VIII, 41; A. 4; V. 2 (4); P. 19; Ll. 114.

Compressed and rather angular and pointed forward, tapering rapidly behind the abdomen to thin and slender in the caudal region, depth equalling one-fourth of the total length without the caudal fin, width hardly half the depth. Head large, two sevenths of the entire length, half as wide as deep, chin rising forward. Snout short, blunt, in length equal to the width of the interorbital space or half the length of the eye. Nostrils, both very small, equal in size, close together, immediately in front of the orbit, anterior above the level of the posterior. Eye large, twice as long as the snout, double the width of the interorbital space, one third as long as the head, very prominent. Mouth wide, descending backward; maxillary reaching to a vertical from the middle of the eye. Teeth small, in narrow villiform bands on the jaws; stronger, hooked, and in a single rather prominent long curved V-shaped series on the vomer; absent from the palatines. Opercular spine moderate, hidden in the skin; no other spines. Apparently without a barbel. Pseudobranchiæ. Gills four, a slit behind the fourth; rakers 5+11 on the forward edge of the first arch, slender, longest as long as the snout. Measuring from the end of the snout the body cavity is one and one-half times as long as the head. Gill openings wide; membranes united, free from the isthmus. Eight pyloric cæca.

Base of first dorsal shorter than the eye, first ray above the base of the pectoral. Base of second dorsal separated from the caudal by a distance equal to the length of the orbit, first ray of the fin nearly above that of the anal, which latter is immediately behind the vent. Pectorals narrow, slender, two-thirds as long as the head, or more. Ventrals long, slender, as long as the head, presenting the appearance of a single bifid ray but seen on dissection to be composed of two long rays closely bound together and a couple of short rudiments concealed by the skin.

Scales very small, those on the head and the snout minute. Lateral line indistinct. Though the specimen described is only three and one-half inches in length, its ovaries are filled with eggs that appear to be about mature.

Muscular portions reddish-brown; fins lighter to whitish; throat, belly, and sides of the head blackish with a silvery lustre; linings of mouth and gill chamber white, those of the abdomen black.

This species is distinguished from *M. verecundum* Gilb. by the larger number of rays and the shallower notch in the anal fin, the greater length of ventrals, pectorals and maxillary, and the larger number of scales in a longitudinal series.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3432	24° 22′ 30″ N.	109° 3′ 20″ W.	1421 fathoms	37.8° F.	Br. M. bk. Sp.

LEPTOPHYCIS gen. n.

The outlines of this form bear considerable resemblance to those of species of Gaidropsarus and Lepidion. The body is elongate, compressed, and slender backward; it has a short cavity; and head and body are covered with small scales. Mouth large; jaws nearly equal; teeth small, in villiform bands on the jaws, absent from vomer and palatines. Four gills, a slit behind the fourth. Seven branchiostegal rays. No pseudobranchiæ. No barbel. Gill rakers on the outside of the first arch numerous, elongate, slender. Fins elongate; two dorsals, hardly separate, anterior with eight rays; ventrals narrow, of about seven rays; caudal distinct.

Leptophycis filifer sp. n.

Plate XLI. fig. 2, 2a.

Br. r. 7; D. 8, 65–70; A. 70–71; V. 7; P. 23; Ll. 120–125; Ltr. 8 + 22.

Much compressed and tapering to very narrow and slender posteriorly; body cavity in the anterior one-third of the length, extending far behind the vent and the origin of the anal fin. Head comparatively large, two ninths of the total length, four fifths as wide as deep, broad and rounded at the snout; crown longitudinally almost straight, strongly convex transversely; chin wide, ascending forward. Snout large, broad, blunt, slightly prominent above the nostrils, one and one fourth times as long as the eye. Nostrils small, both near the upper portion of the eye, close together; anterior much smaller and somewhat higher. Eye large, four fifths as long as the snout, one fourth as long as the head, lateral, prominent. Mouth large, cleft extending below two thirds of the eye and rising considerably forward; maxillary reaching a vertical from the hind border of the orbit. Teeth in villiform bands, on the jaws only; bands wider on the upper jaws, narrow on the lower. A slight prominence of the bone below the mandibular symphysis, a stronger one at the hind ends of the lower jaws. Gills four, a slit behind the fourth; rakers more than half as long as the eye, slender, eight on the outer edge of the first arch on the upper segment and eighteen on the lower. Pseudobranchiæ none. Vent below the origin of the dorsal fin, some distance forward of the end of the body chamber.

Fins with slender rather soft and flexible rays. First dorsal short; third ray prolonged in a filament, longer than the head. Second dorsal united to the first by a low membrane, anterior rays as long as the eye, longest rays near the caudal, median rays shorter. Anal fin similar to second dorsal, but not so deep, and originating slightly forward of it. Caudal separate from the other fins, median rays longer. Pectorals slender, longer than the head. Ventrals narrow, of seven rays, two of the uppermost being very long, near twice the length of the head. Scales thin, deciduous, covering top and sides of head and chin, absent from a small rounded space in front of the vent backward of the ventrals. Lateral line about eight scales below the dorsal, curved anteriorly, indistinct backward. On the head the sense organs of this line are similar to those of *Phyciculus rastrelliger*, Plate LXXXII. fig. 2, but are larger and, in the mandibular series, one or two less in number.

Brownish, probably reddish in life; purplish to black on the chin, belly and sides around the pectorals and up to the dorsal fin; bases of fins and hinder parts of caudal blackish. Linings of mouth, throat and belly blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3410	0° 19′ N.	90° 34′ W.	331 fathoms	44.2° F.	Bk. S.
3404	1° 03′ N.	89° 28′ W.	385 "	43.2° F.	R.

Merluccius angustimanus sp. n.

Plate XLI. fig. 1; Plate LXXXII. fig. 1, Lat. Syst.

Br. r. 7; D. 10, 16 + 19; A. 17 + 19; V. 7; P. 17; Ll. 110 ca.; Ltr. 13 + 39.

Moderately elongate and compressed; depth nearly one sixth of the total length; width three fourths of the depth; caudal pedicel slender. Head long, one third of the length to the base of the caudal, four fifths as wide as high, narrower toward the throat; crown broad, longitudinally straight, slightly arched transversely, interorbital space one and one third times as wide as the eye. Snout long, broader than deep, blunt at the end, one and one half to one and two thirds times as long as the orbit. Eye large, two thirds as long as the snout, nearly one fifth of the length of the head, rising to the level of the crown. Mouth wide, cleft descending backward to below the middle of the eye, lower jaw longer. Teeth medium, slender, acute, compressed near the point, depressible, in a couple of widely set series on jaws and vomer, outer series smaller. No palatine teeth. Chin prominent, blunt, ascending gradually forward, without a barbel. Gill opening wide, extending forward farther than the middle of eye; membranes slightly united, free from the isthmus. Four gills, a short cleft behind the fourth; first arch bearing eighteen slender rakers on its outer edge, the longest two thirds as long as the eye. Nostrils small, widely separated across the head, nearer to the eye than to the end of the snout, posterior subcrescentic, anterior smaller, circular, close to the posterior.

First dorsal originating above the bases of the pectorals, the length of its base hardly equal to that of the snout, third and fourth rays longest, forming an acute angle with the shorter rays behind them. Second dorsal separated from the first by less than half of the ocular diameter, nearly divided into two parts by a notch at the sixteenth ray, which is the shortest, longest rays among the hinder, not reaching the caudal, rounded on the angles. Anal fin like the second dorsal, with a notch at the sixteenth ray, and with its longest rays near the caudal base. Caudal more than half as long as the head, hind margin slightly indented. Pectorals narrow, long, two thirds as long as the head or longer, reaching to the fifth ray of the anal or backward. Ventrals small, little more than two thirds as long as the pectorals, bases forward of those of the latter, extremities not reaching to the vent.

Scales small, those of the lateral line somewhat larger, very thin, marked with fine concentric striæ, very small on the top of the head and on the opercles, in about thirteen series above the lateral line and thirty-nine below it. Anteriorly the lateral line is above the middle of the flank, to which it descends near the middle of the total length, whence it continues distinctly visible to the caudal. On the head the sensory apparatus of the lateral system takes on a peculiar appearance, Plate LXXXII. fig. 1. The distribution of the disks corresponds with that of the Brotuloids or with other Gadidæ, Plate LXXXII. fig. 2. The disks differ somewhat in their irregular sizes and in their shapes, being like short transverse bands apparently without the circular or oval centra. The upper or glandular layer appears to be evenly spread over the entire upper surface of the band and does not show limits as in all the other species dissected. These differences no doubt attend some difference in function as compared with the other forms; the differentiation in structure attests this, but whether in the direction of tactile, electrical, or light producing facilities cannot be determined at present. The glandular layer is deeper near the middle of the band, and it may be the centra are obscured by partial maceration. Apart from the shapes and absence of centra, accord with the system in Gadus, Phycis, and the Brotuloids is evident. The mucus chambers on the top of the head are large, larger than on the sides. Along the courses of the tubes, at their edges or over them, there is a row of small closely set pores, most noticeable close above and below the nostrils and forward from them to the end of the snout.

Top of head, middle line of back, dorsal and caudal brown; upper portions of flanks brownish; sides and lower surface of head and lower portions of body silvery to whitish; linings of gill chamber and abdomen black; pectorals marked with blackish or black posteriorly.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. M.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fne. gy. S.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Gn. M.
3396	7° 32″ N.	78° 36′ 30″ W.	259 "	47.4° F.	Hrd. gy. M. S.

Antimora rhina sp. n.

Br. r. 7; D. 5 (4–5) + 54–56; A. 39–41; V. 6; P. 19–21; Ll. 145; Ltr. 11 + 43 ca.

Depressed and pointed at the snout; compressed and narrow in the body and tail; body cavity more than half of the total length. Head about two ninths of the total, or two thirds as long as the distance between ventrals and anal, wider than deep, narrower on the top, flattened to slightly concave at the interorbital region, with a keel-like suborbital ridge. Snout longer than the eye, less than one third of the head, extending beyond the intermaxillaries one half the length of the eye, rather sharp at the end, broad and flat, edges continued back in a low keel along the side of the head below the eye. Nostrils small, close together, immediately in front of the eye, posterior much larger than the anterior, from which it is separated by a valvular flap. Mouth very wide; maxillary narrow, reaching a vertical from the hind border of the orbit. Teeth small, in narrow villiform bands on the jaws and in a small bunch on the vomer. Eye large, one fourth as long as the head, equal to the interorbital space, one and one eighth times the length of the snout. Barbel short, less than half the length of the eye. Four gills, a slit behind the fourth; membranes hardly united, free from the isthmus; rakers short, one fourth as long as the eye, curved, 4 + 12 on the forward edge of the first arch. Pseudobranchiæ glandular. Vent below the twenty-first ray of the second dorsal, or about midway from head to end of dorsal base.

First ray of anterior dorsal longest, more than two thirds as long as the head, prolonged in a filament, above the axil of the pectoral. The notch between the dorsals is very narrow. Anal fin originating below the twenty-second ray of the second dorsal, median rays shortened. Pectorals small, more than half as long as the head. Ventrals inserted about half way between the pectoral bases and the isthmus, first ray long, second ray longest and filamentary, nearly as long as the longest ray of the dorsal, three fourths as long as the head. Caudal pedicel slender; fin narrow, median rays longest.

Scales small, thin, bearing longitudinal striæ on half or more of their length, covering body and head. Branchiostegal rays and bases of fins scaly. Eleven series of scales between the dorsal and the lateral line.

Dark brownish, probably tinted with purple in life; linings of mouth, gill chamber, and abdomen black.

In comparison with types of *A. viola* it is found that the violet color of the latter appears on a specimen that has lost its scales; on such as have the scales the color is dark brown to blackish. The description of *A. rostrata* says "This species is readily distinguished by the peculiarly produced snout, which forms a short, triangular, pointed lamina, sharply keeled on the sides, and overreaching the cleft of the mouth." The figure given in the "Challenger" report is not so sharply keeled on the sides, but for this reason it no doubt better represents a specimen on which the tissues are not so much contracted and shrunken by preservatives. *A. rhina* has a longer dorsal and smaller scales than *A. microlepis,* and it differs in other respects, though the two species are somewhat closely allied.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.

Læmonema gracillipes sp. n.

Plate XLII. figs. 1, 1 a.

Br. r. 7; D. VI, 63–68; A. 61–64; V. 2 (5–6); P. 21–23; Ll. 171; Ltr. 14 + 39 ca.

Elongate, compressed behind the shoulders, tapering to very slender posteriorly; body cavity less than two fifths of the total. Head moderate, somewhat depressed, as broad as high, little less than one fourth of the total length, convex on the cheeks and in front of the nape; crown flattened on the interorbital space and forward. Snout short, broad, rounded, blunt; three fourths as long as the eye, in length equal to the interorbital width.

Nostrils close together immediately in front of the eye, nearly equal in size, anterior with a short tubular valve. Eye large, prominent, one and one third times the length of the snout or the interorbital width, two sevenths as long as the head. Mouth medium, cleft extending below the eye; maxillary reaching a vertical from the middle of the eye, or a trifle farther. Teeth small, in villiform bands on the jaws, and in a small group on the head of the vomer. Barbel more than half as long as the eye. Four gills, a slit behind the fourth; rakers slender, longest half as long as the eye, 5 + 14 on the forward edge of the first arch. Eight pyloric cæca.

Base of first dorsal short, hardly three fifths of the eye; longest ray with its filament half as long as the head, first ray above the base of the pectoral. Second dorsal immediately behind the first, more developed than the anal; hinder rays reaching to the bases of the median caudal rays. Anal fin not so deep as the dorsals, longest rays near the vent, posterior rays not reaching as far back as those of the dorsal, shortest rays near the middle of the fin, origin below the twelfth ray of the second dorsal. Caudal narrow, separated from dorsal and anal, hind margin convex, length about one and a half times that of the eye. Pectorals short, comparatively broad, pointed. Ventrals slender, second ray little longer than the head, first ray shorter, free for more than half of its length; rudimentary rays visible only by dissection, most developed in the young.

Scales small, covering body and head, absent from part of the snout, in fourteen series above the lateral line and thirty-eight below it, one hundred and seventy-one scales on the line from head to tail. Lateral line distinct to the caudal.

Brown, with a reddish tint; vertical fins and pectorals blackish; ventrals whitish.

Compared with the two species from the Atlantic, *L. gracillipes* bears a greater likeness in shape to *L. barbatula* while in the formulæ the approach is greater to *L. melanurum*.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.
3385	7° 32′ 36″ N.	79° 16′ W.	286 "	45.9° F.	Gn. M.
3410	0° 19′ N.	90° 34′ W.	331 "	44.2° F.	Bk. S.

Phyciculus longipes sp. n.

Plate XLII. figs. 2, 2 a.

Br. r. 7; D. 10 + 55–63; A. 59–63; V. 6; P. 24–26; Ll. 96–102; Ltr. 7–8 + 24.

Shoulders and head thick and heavy; body much compressed, tapering rapidly behind the abdominal chamber, thin and slender in the posterior half; depth, nearly equal to the length of the head, less than one fourth of the total length. Head little more than four times in the entire length, as wide as deep, broader than deep in the forward half, flattened beneath, broadly rounded from the shoulders to the snout, depressed on the interorbital space. Snout short, shorter than the eye, broad, rounded, blunt. A slender barbel, not as long as the eye. Eye large, prominent, longer than the snout, equal to the interorbital width, less than one fourth as long as the head. Mouth large, cleft reaching to or behind a vertical from the back edge of the eye, maxillary extending one third of the orbital diameter farther back. Teeth in villiform bands, absent from vomer and palatines. Nostrils close together, immediately in front of the eye, posterior appearing vertical and narrow, anterior round and not half as large. Gills four, a slit behind the fourth; rakers slender, not half as long as the eye, 5 + 13 on the outer edge of the first arch. Vent below the axil of the pectoral, half the orbital diameter distant from the anal fin.

Dorsal and anal moderately deep, their bases separated from the short rays of the caudal by less than one third of the diameter of the eye, longest rays extending to the bases of the longest rays of the caudal. First dorsal small, base as long as the distance from the middle of the eye to the end of the snout, third or fourth ray longest, half as long as the head, origin above the base of the pectoral. Neither second dorsal nor anal is much lower in the middle; the former is separated from the first dorsal by a very narrow notch. The anal is little shorter than the second dorsal and originates below the hindmost ray of the first dorsal. Pectorals small, reaching back below ten or eleven rays of the second dorsal, pointed. Ventrals small, of six rays, first and second with filaments, second as long as from snout to dorsal, bases widely separate. Caudal pedicel slender; fin narrow, ending in a blunt point or rounded.

Scales small, covering body and head, very small on the snout. Lateral line eight scales from the dorsal, interrupted and difficult to trace or obsolete in the hinder two thirds of the length. On the head the mucous cavities are large, and the largest glands of the series lie on the top between the orbits.

Nine pyloric appendages.

Muscular portions reddish brown, snout darker, blackish on the branchiostegal rays, lips, belly, bases of ventrals, axils of pectorals, hinder angle of second dorsal, extremity of caudal and lower half of anal. Dorsal light, pectorals and outer halves of ventrals lighter. Scales on sides of head and abdomen silvery, those of the breast bronzed.

Distinguished from *Phyciculus nematopus* Gilb., by a greater number of rays in the dorsal and a smaller number in the ventrals, and from *P. rastrelliger* by the longer dorsal and the smaller ventrals.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3355	7° 12′ 20″ N.	80° 55′ W.	182 "	54.1° F.	Bk. G. Sh.
3385	7° 32′ 36″ N.	79° 16′ W.	286 "	45.9° F.	Gn. M.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fne. gy. S.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Gn. M.

Phyciculus rastrelliger.

Phyciculus rastrelliger Gilb., 1890, P. U. S. Mus., XIII., 113.

Plate LXXXII. fig. 2, Lat. Syst.

Br. r. 7; D. 8, 54–58; A. 58–63; V. 7; P. 26–27; Ll. 99–105; Ltr. 8 + 25.

Rather stout, thick and massive anteriorly, as broad as deep forward, compressed, tapering and slender backward, snout to end of body cavity not twice as long as the head, depth near one sixth of the total length. Head one fourth of the entire length, as broad as deep posteriorly, wider than deep forward, narrowing toward the snout, crown broad and forming a low arch, interorbital area flattened. Snout moderately broad, as long as the eye, near one fourth of the length of the head, blunt and rounded at the end. Barbel slender, shorter than the eye. A blunt angle at the mandibular hinge. Mouth large; cleft rising forward, reaching nearly or quite to a vertical from the hind border of the orbit. Teeth on the jaws, in villiform bands, outer not enlarged, absent from vomer and palatines. Nostrils small, close together, immediately in front of the eye. Eye large, prominent, length equal that of the snout, hardly one fourth of that of the head, equal the width of the interorbital space. Muscles from the nape extending very little on the space between the eyes. Gills four, a slit behind the fourth; rakers one fourth as long as the eye, blunt, 8 + 20 on the outer edge of the first arch. Gill openings wide, membranes united for a distance equal to three fourths of the diameter of the eye, free from the isthmus. Body cavity reaching behind the vent, which is slightly backward of the dorsal origin. Vent midway between bases of ventrals and anal.

Anterior dorsal short, low, longest ray equal to the length of snout and eye, origin above the axil of the pectoral. Second dorsal close to the anterior, lower in the middle, longest rays near the caudal. Dorsal and anal hardly reaching to the caudal. Anal origin below the hind portion of the base of the first dorsal, median rays short, longest rays near the base of the caudal. Caudal distinct from dorsal and anal, length equal to that of longest ray of the dorsal or two fifths of that of the head, pedicel slender, hind border convex. Pectorals small, broad-based, more than half as long as the head, reaching back above seven or eight of the anal rays, pointed. Ventrals small, two fifths as long as the head, far apart, below the opercle, prolonged in a short filament, reaching the anal.

Scales thin and small, very small over head and snout; in seven or eight series above the lateral line and in about one hundred transverse rows between head and caudal. Lateral line curving toward the dorsal anteriorly, less distinct toward the tail. On the head the disks of the system are small and protected by thick dermal coverings; their comparative sizes and their arrangements are shown on Plate LXXXII. fig. 2.

Cheeks top of head and flanks brownish, with a yellowish or greenish cast; belly black, with a bluish tint and a metallic lustre; snout blackish; a small space of blackish behind the base of each pectoral; branchiostegals and fins blackish; inside of mouth and linings of abdomen silvery.

On some specimens there are nine rays in the first dorsal; one has eight branchiostegal rays on one side.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.
3385	7° 32′ 36″ N.	79° 16′ W.	286 "	45.9° F.	Gn. M.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 "	48° F.	Fne. gy. S.
3396	7° 32′ N.	78° 36′ 30″ W.	259 "	47.4° F.	Hrd. gy. M. S.
3397	7° 33′ N.	78° 34′ 20″ W.	85 "	57.3° F.	Stf. gn. M. brk.

Bregmaceros longipes sp. n.

Plate XLIII. figs. 6–9.

Br. r. 7; D. I, 18 + 10 + 19 (I, 44–47); A. 19 + 10 + 19 (44–47); V. 6; P. 16; Ll. 60–62; Ltr. 10.

Body somewhat compressed, depth about one seventh of the length to the base of the caudal, changing but little until near the end of the dorsal. Head about one fifth of the length without the caudal, narrower than deep, width not far from three fourths of the depth, upper outline resembling the lower, crown convex. Snout little more than half as long as the eye, equal the width of the interorbital space, very blunt, rounded from all sides, lower jaw as long as the upper. Mouth large, hardly extending backward of a vertical through the middle of the eye, jaws equal. Teeth small, subconical, short, sharp, slightly hooked, in a single series on each jaw and toward each side of the vomer (two or three teeth). Eye large, one third as long as the head, nearly twice the length of the snout. Gills four, a slit behind the fourth; gill rakers short. No pseudobranchiæ.

First dorsal ray isolated, immediately behind the skull, reaching back to the next ray, which is one length of the head backward of the bases of the pectorals, opposite the origin of the anal fin. The second dorsal, as it may be called, is made up of three sections, the first of sixteen to eighteen rays is separated from the third by about ten short slender rays. The third section extends almost to the caudal short rays. The anal also, like the dorsal opposed to it, contains three sections, the median, consisting of ten short rays. Ventrals long, prolonged in a filament reaching little backward of the front end of the second section of the anal fin, of six rays, the anterior three of which are longest, the posterior three short, originating below the preoperculum. A fold at each side of the belly from the shoulders to the forward portion of the anal forms a trough to receive the ventrals. Caudal short, notched.

Scales large, with prominent concentric striæ, cycloid, in ten longitudinal and sixty to sixty-five transverse series, in eight series along the caudal pedicel. Lateral line a deep groove curving upward from the upper angle of the gill opening till close to the median line near which it continues along the sides of the dorsal to within about fifteen rays of the end of this fin where it ends abruptly. An air bladder. Two pyloric cæca, short and thick. In a female of one and one fourth inches the ova are nearly or quite mature. Largest specimen measuring one and seven eighths inches.

Flanks, cheeks, and iris silvery; back appearing brownish from numerous small spots; top of head darker. There is a long group of small spots, near the hinder part of the first section of the anal, on the lower edge of the flank passing backward a short distance along the second part of the fin. A group of the spots at the base of the caudal. Entire ventral surface light except in a series of blackish dots at the bases of the anal rays, anteriorly in the fold and more or less complete backward; these are covered by membranes and simulate the luminous spots of the Scopeloids.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3423	16° 47′ 30″ N.	99° 59′ 20″ W.	94 fathoms	56° F.	Green mud.

This species has a larger eye than either *Bregmaceros Macclellandii* or *B. atlanticus* and its snout is shorter, more blunt, and less conical. *B. longipes* is less closely allied to either of the last two than they are to one another. *B. Macclellandii* has been reported from the China Seas and from the Philippines to Bengal, where Alcock notes its occurrence from 128 fathoms. *B. atlanticus* was taken by the steamer "Blake," in the West Indies off Nevis and Grenada and in the Gulf of Mexico, lat. 25° 33′ N., lon. 84° 21′ W. in depths varying from 101 to 305 fathoms.

MACRUROIDS.

This is a deep sea family of which a few members are found near the surface. It contains a small number of genera, but the latter are made up of a large number of species and these, again, judging from their abundance in the dredges and trawls, include hosts of individuals. The family generally is well adapted to bathybial conditions, even in the few species dwelling in the shoaler waters, and probably is distributed from the Arctic to the Antarctic regions in all the oceans. Immense numbers of individuals, with the fact of remaining on or near the bottom, sufficiently account for frequency of capture. The species themselves are mostly of local distribution, and it is altogether probable that most if not all of those to which wide distributions have been assigned will yet have to be subdivided.

The greatest depths from which up to this date Macruridæ have been obtained are the following: 1823 in the northeastern, 1875 in the northwestern, 2160 in the southeastern, and 2425 fathoms in the southwestern parts of the Pacific; 2327 in the northeastern, 1870 in the northwestern, and 2650 in the southwestern portions of the Atlantic; 1375 to 1950 in the Antarctic, and 1310 fathoms in the northern sections of the Indian Ocean.

As may be seen in various cases in the subjoined list, the vertical range of a single species is sometimes more than one thousand fathoms, in one instance, that of *Nematonurus armatus* Günt., more than two thousand, which indicates conclusively enough the ineffectual nature of pressure as a barrier in the vertical distribution of species. If the general adaptability of tissues and structure to changes of conditions is considered, there is no evident reason for surprise in the fact that individuals of a species are comparatively indifferent to variations in pressure corresponding to hundreds or thousands of fathoms of depth. Similar adaptiveness to variations in temperature is no doubt possessed by most forms.

So far as known modification by life at great depths includes the acquisition of no special organs among the Macruridæ. The eyes of some are enlarged, none of the known species are blind, but no special luminous organs appear. The canals and glands of the lateral system have become much enlarged and have assumed much greater functional prominence, apparently without much change in structure, yet it is probable that the mucous is more phosphorescent and that the glands have become flash organs in various species. Some of the species have filamentary growths on the fins, and in those from the greater depths the armature and the tissues are less firm. The changes in the skull on account of enhanced function of the lateral system are amply set forth on Plates L. and LI., the greater amount of modification existing in the ridges inclosing and protecting the organs of that system.

Among the species described below there are close allies of *Coryphænoides Bairdii* and *C. carapinus*, but all told the affinities are little closer across the Caribbean with species of the Atlantic than across the Pacific with others described by Alcock from the northern parts of the Indian Ocean.

The variations among the numerous species are so gradual from one to another that genera are only to be separated with difficulty. While the authors of the Oceanic Ichthyology recognize seventeen genera, it appears from recent additions and the present material that it would be better to reduce the number to three, Bathygadus, Coryphænoides, and Trachyrhynchus, placing the balance of the genera so called as subgenera (Macruronus a possible exception) under Coryphænoides, which last dating from 1765 takes precedence over Macrurus of 1787. This is an approximation to the arrangement of Günther, 1887. Only a dozen species in all were recognized by Günther in 1862; in 1887 his list of the deep sea species amounted to forty-six. Goode and Bean, 1896, Oc. Ich., xxv., give a list of eighty-five species (three of the species and three of the genera being new). In the list herewith there are a hundred and twenty-five species, a score of which are new.

MACRURIDÆ.

Macrurus bulbiceps sp. n.

Plate XLIV. figs. 1–1 b.

Br. r. 6; D. 11 + 107; A. 99; V. 8; P. 22–23.

In form this species resembles *M. bucephalus* to some extent; it is readily distinguished, however, by the shorter head, a blunter snout, the scales, and the dentition, and by the shapes on the top of the snout, and on the preopercle. Body much, and head but little compressed, depth one sixth of the total length; caudal region tapering regularly to the slender extremity. Head nearly one fifth of the total length, hardly as wide as deep, massive, rounded, blunt anteriorly, convex on the crown and the snout. Snout broad, blunt, convex and descending from the interorbital space, shorter than the eye, without prominent tips on either lateral or median angles, length from the maxillaries one half of that of the eye. Cheeks convex; suborbital ridges very low. Eye large, orbit longer than the snout, equal to the width of the forward part of the interorbital space or to one fourth of the length of the head. Mouth large; maxillary reaching backward of the middle of the eye. Teeth conical, separated, in a single rather irregular series. Preopercle with hinder angle less prominent and lobular, and hinder outline less concave than on *M. bucephalus*. Barbel slender, three fifths as long as the eye. Interorbital space convex, widening rapidly backward. Supranarial ridges strongly bent toward one another between the nostrils.

Origin of the spinous dorsal above the axil of the pectoral; first spine very small; second spine largest, slender, with spinules few and scattered, and with a filament, total length three fifths of that of the head; base as long as the orbit. Second dorsal low, feeble anteriorly, origin distant from the base of the first dorsal one length of the orbit. Anal well developed, one and one third lengths of the orbit farther backward than the base of the first dorsal, backward of the head three fourths of the length of the latter, distant from the ventrals two thirds of the length of the head. Vent close to the anal fin. Ventrals small, below the base of the pectorals, first ray filamentary at the end, half as long as the head or longer. Scales moderately harsh; the spinules with which they are thickly beset are low and not bristling as in the case of *M. bucephalus.* No pyloric appendices.

Rusty brownish; blackish on the fins and belly and on the linings of the body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3363	5° 43′ N.	85° 50′ W.	978 fathoms	37.5° F.	Wh. glob. Oz.

Macrurus bucephalus sp. n.

Plate XLIV. figs. 2–2 b.

Br. r. 6; D. 10 + 87–93; A. 94–97; V. 9; P. 23.

Body cavity short; caudal region compressed, thin, elongate, tapering rapidly near the abdomen and gradually backward to a slender threadlike extremity. Head rather short and broad, near one fifth of the total length, subround in transsection, little higher than wide. Snout short, blunt, with three low angles, median angle not greatly in advance of the lateral, length equal to that of the eye or to the width of the interorbital space, steep in front of the mouth, distance of the tip from the maxillaries two thirds of the length of the orbit. Eye of medium size, one fourth as long as the head, orbital length equal to that of the snout or to the interorbital width. Mouth large, subtending about two thirds of the eye. Teeth small, in villiform bands, outer series of the upper jaw separated and larger. Suborbital ridge low, rounded, hardly apparent backward of the orbit. Barbel small, half as long as the eye, one sixth longer on large specimens.

The supranarial ridges are nearly parallel and straight from the orbit to the lateral angle on the snout. On the preopercle the lower angle extends down and backward as a much rounded lobe making the hind margin deeply concave above it.

First dorsal originating above the bases of the pectorals; first spine small, weak; second slender, with small spinules at a moderate distance from one another, with a filamentary extremity; base as long as the eye, descending gradually backward. Second dorsal low, scarcely visible forward, separated from the first dorsal by one length of the base of the latter. Anal well developed, origin below the middle of the space between the dorsals. Ventrals small, first ray with a hair-like filament which reaches back upon the anal fin, origin little farther backward than that of the pectorals. Vent close to the origin of the anal, distant from the head less than two fifths of the latter's length. Scales small, harsh with sharp spines in keel-like series, those in the median series larger. Six scales in a row from the lateral line to the base of the first dorsal.

Black, shading to purple over the muscular portions of the body; linings of mouth and body black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3430	23° 16′ N.	107° 31′ W.	852 fathoms	37.9° F.	Bk. S.
3398	1° 7′ N.	80° 21′ W.	1573 "	36° F.	Gn. Oz.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 "	54.8° F.	Rk. & S.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.

Macrurus liraticeps sp. n.

Plate XLV. figs. 1–1 b.

Br. r. 6; D. 10–11 + ?; V. 8; P. 22.

Head and body massive; caudal section elongate, compressed; greatest depth equal to five sixths of the length of the head. Length of the head about two thirds of the distance from the snout to the anal fin. Bones of the skull firm. Snout large, longer than the orbit, lateral angles moderate and separated by a distance equal to the orbital length. On the skull the rostral ridges are strong, the median being highest and extended back to the interorbital region where it becomes lower and continues to the hinder portion of the space. There is a ridge backward from each eye on the crown; the skull rises in a bony edge above the orbits; and across the angles between the nostrils and the eye the distance is greater than that between the lateral angles at the end of the snout. Eye large, equal in length to the interorbital width, one and one half times the distance from the end of the snout to the intermaxillaries, hardly one fifth of the length of the head. Interorbital space deeply concave on the skull, but no doubt filled with tissues in life so as to be plane or convex. Suborbital ridge low, distinct, rounded, ending at a vertical from the hind border of the orbit. Mouth large, reaching below the forward half of the eye. Teeth small, in villiform bands, larger in the outer series of the upper jaw. Barbel small, nearly half as long as the eye. Occipital crest of the skull high and strong, the crest at each side of it lower but distinct.

Dorsal origin above the base of the pectoral, first spine small, second spine long, strong, compressed, without serrations on its forward edge. Second dorsal low, weak. Anal well developed, backward of the first dorsal about one length of the base of the latter. Ventrals small, inserted below the bases of the pectorals or a very little farther back. Scales medium, in their exposed portions bearing keels which are so fine as to appear smooth to the touch on individuals of two feet in length; those on the head apparently thickened, rougher; five scales in a row from the lateral line to the base of the first dorsal. Vent close to the anal fin. No pyloric cæca.

Brownish, darker on the hind borders of the scales, reddish or purple tinted in life.

Certain features on these specimens suggest the possibility of a considerable metamorphosis in the species; the scales may have been much rougher in young stages, and the second spine of the dorsal may have possessed serrations or spinules on its forward edge. Filaments probably exist on the ventrals and first dorsal.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3407	0° 4′ N.	90° 24′ 30″ W.	885 fathoms	37.2° F.	Glob. Oz.

Macrurus barbiger sp. n.

Plate XLV. figs. 2–2 b.

Br. r. 7; D. 11 + 116; A. 103; V. 11; P. 21; Ll. ca. 155.

This species resembles *M. liolepis* in shape, but has the head more round, the cheeks more convex, the snout narrower, and the barbel longer, besides which differences there are others in the fins and the colors. Body rather massive, moderately compressed, depth three fifths of the length of the head, total length two and two thirds times the length of the body cavity; caudal section compressed, slender, filamentary toward the end. Head short, four and three fifths times in the total, rounded on the sides and below, flattened on the crown, narrowed and pointed at the snout. Snout short, four fifths as long as the eye, narrowing forward, prominent, length from the teeth equal that from the eye, ending in a bunch of small spines; a small spinose angle at the junction of the supranarial with the suborbital ridges. Suborbital ridges low, not extended on the preopercle. Skull with a median ridge on the snout reaching backward to the interorbital space, and with two short, curved ridges between the hind portions of the eyes on the crown. Mouth medium, front edge below the anterior nostril, end of maxillary a trifle in front of the hinder edge of the orbit. Teeth small, subconical, in villiform bands, larger in the outer series of the upper jaws. Barbel slender, as long as the orbit. The prominent edge on the preopercle descends slightly backward and bears a shallow indentation above the rounded lower extremity. Eye prominent, large, longer than the snout, three and three fifths times in the length of the head, equal the interorbital width. Orbits rising above the space between them. Opercular membranes well developed, hinder angle of operculum turned up and backward and reaching below the second ray of the dorsal. Base of the first dorsal hardly as long as the eye, origin above the axil of the pectoral. Dorsal spine smooth, or with one or two small cusps near the base, about two thirds as long as the head, including the filamentary extremity. Second dorsal fin low, separated from the first by one and one half times the length of the base of the latter. Pectorals small, shorter than the first dorsal. Ventrals small, bases below the middle of the operculum, forward of the pectorals; upper ray with a filamentary extremity, as long as the first dorsal ray.

Gill membranes united, free from the isthmus; openings wide. Four gills, slits short, that behind the fourth gill very short; rakers absent from the front of the first arch, elsewhere rudimentary.

Vent between the ventrals, nearer to their bases than to the origin of the anal, from which it is separated by the length of the snout.

Scales without spinules, thin, deciduous, with very fine striæ, absent from the suborbital section and the lower surface of the head.

Length of the specimen described ten inches.

Head black; linings of mouth and body cavity black; muscular portions and fins brown to blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3424	21° 15′ N.	106° 23′ W.	676 fathoms	38° F.	Gy. S. bk. Sp. Glob.

Macrurus liolepis.

Macrurus (*Lionurus*) *liolepis* Gilb., 1890, P. U. S. Mus., XIII., 117.

Br. r. 7; D. 11–12 + 126–130; A. 114–123; V. 11; P. 21–23; Ll. ca. 190; Ltr. ca. 38.

Body elongate and compressed, rapidly becoming slender behind the chamber. Head one fifth or more of the total length, two thirds as wide as high, angular in front, flattened to concave on the crown; cheeks steep. Skull prominent in the upper orbital margins, with a median and two lateral ridges in front of the interorbital space and with a pair of short divergent ridges, one at each side of the middle, just behind it. Snout short, three fourths to four fifths as long as the eye, equal the width and the distance from the mouth, ending in a median angle or short knob bristling with sharp tooth-like spines. At each side of the median knob there is a shorter one, on the end of each narial ridge, with similar spines. Eye large, one and one fourth times either the interorbital space or the snout, nearly one fourth as long as the head. Opercular flap slightly produced above the base of the pectoral, in a rounded point, to a vertical from the dorsal origin. Mouth of medium size, as long as the eye and subtending about four fifths of it; maxillary reaching nearly or quite to a vertical from the hind edge of the orbit. Teeth small, subconical, in villiform bands, equal in the lower jaws, larger in the outer series of the upper. Barbel small, half as long as the eye; on one specimen it is bifid. Suborbital ridge prominent, continued through the narial knobs to the end of the snout, extending little backward of the eye. Prominent edge on the preopercle nearly straight, descending slightly backward, lower angle rounded and reaching little farther back. Nostrils close together near the eye, posterior larger, anterior bordered by a prominent membrane which opens forward. Scales small, thin, without spines, with fine concentric striæ, seven above the lateral line and thirty-one to thirty-three below it in a transverse series. Vent between the bases of the ventrals and nearer to them than to the origin of the anal. Bases of the ventrals below the lower angle of the operculum, little farther forward than those of the pectorals; first ray with a filament, half as long as the head. Dorsal fin narrow; base of the first section as long as the eye; second spine twice the length of the eye, three fifths of the head, smooth or occasionally with one or more spinules near the upper end, prolonged in a filament.

Dorsals separated by a space equal to the base of the first. Caudal end filamentary. Origin of anal distant from the vent about four fifths of the length of the eye; fin rays much longer than those of the dorsal. Thirty-seven pyloric cæca.

Brownish, with a greenish or olivaceous tinge in life; linings of mouth and body cavity black.

Largest specimen about twelve inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.
3424	21° 15′ N.	106° 23′ W.	676 "	38° F.	Gy. S. bk. Sp. Glob.
3436	27° 34′ N.	110° 53′ 40″ W.	905 "	37.2 F.	Br. M. bk. Sp.

Macrurus capito sp. n.

Br. r. 6; D. 10 + ?; A. ca. 100; V. 9; P. 23.

Body and head compressed, caudal section decreasing in size rather abruptly near the abdomen, thin farther back and tapering gradually to a filamentary end. Head large, two ninths of the total length, three fourths as wide as high, high and arched from the nape to the dorsal, descending from the nape to the end of the snout. Suborbital ridges moderately prominent. Crown slightly convex transversely. Snout sharp as viewed from the side, broader than the interorbital space, longer than broad, as long as the eye, with three angular prominences, median longest; distance of the tip from the maxillaries three fifths of the length of the eye. Mouth medium, horizontal, subtending nearly half of the eye. Eye large, as long as the snout, as long as the mouth, as long as the base of the dorsal, one and one fourth times the width of the interorbital space. Teeth very fine, in villiform bands, larger in the outer series of the upper jaw. Barbel small, about one third as long as the eye.

Dorsal origin above the base of the pectoral; first spine short and stout; second spine sharp-edged in front, with close-set spinules and filamentary end; base descending rapidly backward. Second dorsal low, anterior rays short and weak. Anal well developed forward, originating below the hind portion of the base of the first dorsal, distant backward from the head about the length of the orbit. Ventrals small, reaching the anal, inserted below the origin of the pectorals. Pectorals medium, two thirds as long as the head. Scales spinose, the spinules arranged in longitudinal series and so long as to present a hairy or pilose appearance; harsh over head and body, especially on the three angles of the rostrum. Seven pyloric appendages.

Dark brownish, possibly reddish in life, the skin showing silver tints below the scales.

The specimens from Station 3417 are hardly identical in variety with those from Station 3384; they are closely allied but differ in that the former (*M. vagrans*) is darker in color, and has less of the silver tint.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.
3417	16° 32′ N.	99° 48′ W.	493 "	40.6° F.	Gn. M.

Macrurus leucophæus sp. n.

Br. r. 6; D. 10 + ?; A. 85; V. 8; P. 19.

Closely allied to *M. boöps*, but distinguished by a wider snout, a wider interorbital space, and by the forward position of the ventrals. Form moderately elongate, body much compressed, and, as seen from the side, tapering rapidly but regularly to the slender whip-like caudal extremity; depth near one sixth of the total length. Head about two ninths of the total, in length equal to twice its width or one and three fifths times its depth; crown slightly convex; suborbital ridge distinct but not very prominent, hardly reaching to a vertical from the hind border of the orbit. Snout as broad as long, length little more than the width of the interorbital space, about three fourths as long as the eye, very blunt at the end, as viewed from above, with a median and two lateral prominences, angle formed at the edges moderately pronounced, ascent from the mouth steep, distance of tip from maxillary or from the lateral angles hardly less than one half the orbital length. Orbit large, about one and one third times the length of the snout, one and two thirds times the interorbital width, or three tenths of the length of the head. Mouth comparatively small, maxillary extending below the eye not more than one fourth of the latter's diameter. Teeth small, in villiform bands. Barbel small, one fourth as long as the eye. Origin of first dorsal above the axil of the pectoral; base descending rapidly backward; first ray short; second ray with sharp close-set spinelets on the narrow forward edge, excavated or concave on the sides, prolonged in a slender filament to three fourths of the length of the head; basal length two thirds of the length of the eye. Second dorsal rudimentary toward its origin, weak and feebly developed backward. Anal better developed than the dorsal, originating immediately below the end of the base of the first dorsal, below the middle of the pectoral fin. Ventrals small, below the operculum, forward of the bases of the pectorals, first ray with a filament, reaching the anal. Vent close to the first ray of the anal, farther back than the head by nearly the length of the orbit. Scales medium, spinose, with close set, small, sharp, declined spinules arranged in eight or more longitudinal series, hindmost prickles larger extending beyond the edge of the scale. The scales of the head and snout are smaller and harsher to the touch. The width of the scaly area between the nostrils is equal the width of the snout at the lateral angles. Each angle of the snout is surmounted by a rosette of small spines. Between the lateral line and the base of the first dorsal there are seven rows of scales. Six pyloric appendages.

Brownish gray, with silvery tint where scales are lost, or silvery gray changing to brownish by brown puncticulations; dorsal darker; linings of body cavity and mouth black. Described specimen eight and one fourth inches in length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 9′ 45″ N.	80° 50′ W.	322 fathoms	46° F.	Gn. M.

Macrurus boöps sp. n.

Br. r. 6; D. 10 + ?; A. 95, V. 8; P. 21–23.

In shape this species is similar to *M. leucophæus;* its most patent distinguishing features are a narrower snout, a narrower interorbital space and the backward positions of the ventrals. Body compressed, tapering to a slender thread in the caudal section. Head one fifth of the total length, somewhat compressed, width less than the depth and more than half the length. Outline from snout to first dorsal convex above the nostrils and again at the nape. Snout short, not as long as the orbit, less than twice the interorbital space, distance of tip from maxillaries about equal the distance between the orbits which is two thirds of the width across the lateral angles at the end. The angles in front of the nostrils are not much pronounced, apices with groups of small spines. Mouth of moderate size, maxillary extending below half of the orbit. Teeth small, in villiform bands, subequal, larger in the outer row near the symphysis. Eye large, longer than the snout, two sevenths of the head, length of orbits twice their distance apart. Barbel small, one third as long as the eye. Suborbital ridge low, rounded, scarcely prominent below the hind part of the eye. Dorsal origin above the middle of the pectoral; second spine of medium size, serrate, probably ending in a filament; base descending steeply backward. Second dorsal low, feebly developed anteriorly. Anal more developed than second dorsal, originating backward of the first dorsal about half the length of the base of the latter. Vent close to the first ray of the anal, backward from the head two fifths of latter's length. Ventrals small, inserted on a vertical from the origin of the pectorals, first ray with a filament reaching to the vent. Pectorals medium, passing backward of the anal origin. Scales harsh with short, sharp, closely set spinules in longitudinal keel-like series, the posterior being larger and extending beyond the scale. Five rows of scales between the lateral line and the base of the first dorsal fin. Pyloric appendices seven.

Dark grayish brown or blackish, silvery below the scales; linings of body cavity blackish to silvery. First dorsal and pectorals blackish.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 "	40.1° F.	Sft. bl. M.

Macrurus fragilis sp. n.

Plate XLVI. fig. 1.

Br. r. 7 (7–6); D. 9 +?; A. ca. 177; V. 9; P. 19.

Form elongate, attenuate; body and head compressed; caudal region slender and whiplike. Head about one seventh, and body cavity less than one fourth of the total length. Depth of body two thirds of the length of the head, width of body or head three fifths of the depth. Greatest depth of the caudal region hardly more than half the depth of the body. The dorsal line from the nape to the end of the tail is nearly straight; close behind the belly the ventral line rises abruptly about halfway to and thence gradually approaches the dorsal line toward the end of the tail. Top of head flattened; sides very little convergent forward, nearly parallel. Snout broad, blunt, as long as the eye, equal the width of the interorbital space, median angle prominent, distance from one of the lateral angles to the other equal to that across the head between the eyes. Suborbital ridge low, rounded. Large mucous channels on top of the head; a low median prominence separates them backward to or between the front portions of the eyes. Eye large, one fourth as long as the head, equal to the length of the snout, or a trifle less than the width of the interorbital space. Mouth of medium size; maxillary subtending the entire orbit. Teeth small, in narrow villiform bands on the jaws, outer series little enlarged forward. Barbel slender, nearly as long as the eye. Nine gill rakers on the first arch, rudimentary, each being a short tubercle with several small spines. Gill laminæ short. Origin of first dorsal above that of the pectoral; first spine short; second spine slender, with spinules distant from one another, including the long filament nearly five sixths as long as the head, the spinous portion being only about half of this length. Distance between the dorsals equal to the length of the first. Second scarcely developed anteriorly, feeble throughout. Anal much better developed than the second dorsal and originating very little farther forward; anterior eleven or twelve of the anal rays below the abdominal chamber. Vent below the interspace between the dorsals, near the first anal ray. Ventrals small, outer ray with a long filament which reaches to the seventh ray of the anal, origin forward of that of the pectoral, or below the hind edge of the opercle. Pectorals small, elongate, the filament of the upper ray extending below the origin of the second dorsal. Scales small, thin, deciduous, with concentric striæ; five scales in a row from the lateral line to the base of the first dorsal or thirty-one in a series from this dorsal to the anal. The short first dorsal separates this species from its nearest allies on this coast.

Cheeks, flanks, abdomen, and linings of mouth and body black; muscular portions from the nape backward reddish brown or flesh color, the scales being lost. Over the mucous chambers of the head the color is very light; possibly in life the color of the muscular tracts was darker and red or purple-tinted.

Described specimen nine inches in total length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3360	6° 17′ N.	82° 05′ W.	1672 fathoms	36.4° F.	Fne. bk. dk. gn. S.
3374	2° 35′ N.	83° 53′ W.	1823 “	36.4° F.	Gn. Oz.

Macrurus carminifer sp. n.

Plate XLVI., fig. 2.

Br. r. 6; D. 10 + 89–102; A. 96–105; V. 8; P. 21; Ltr. 30.

Elongate and compressed, slender in the caudal region; depth near one sixth of the total length. From body to tail the taper, in the post abdominal section, is not so abrupt as in either *M. liolepis* or *M. anguliceps.* Head less compressed than the body; two elevenths of the total, subconical.

the angles being rounded off, pointed at the snout. Nape narrow. Crown wider than the snout, low, convex. A median rostral ridge extending back to the interorbital space, but not prominent above the generally convex surface. Snout short, as long as the eye, pointed, ending in a rosette of small spines; prenarial angles hardly distinct, also marked by small rosettes. The length of the snout equals five sixths of the width of the interorbital space; the distance of the tip from the intermaxillary equals the distance from the nasal cavity or two thirds of the length of the eye. Mouth small; maxillary subtending the anterior third of the orbit, hardly as long as the snout. Barbel rather stout, stiff and rigid, three fourths as long as the eye, subcylindrical nearly to the point and thence tapering rapidly. Eye large, as long as the snout, five sixths of the interorbital width, four fifteenths of the length of the head. Exposed surface of the interoperculum small, triangular. Preopercular ridge curved backward at the lower angle. Teeth small, in narrow bands, subequal. Gill rakers short, tubercular, each crowned with several spines. Suborbital ridge low, rounded on the edge, hardly subtending the orbit. The distance from the snout to the vent is one and one half times the length of the head. Vent near the anal origin. Nine to ten long pyloric appendages. Second dorsal spine strongest, compressed, sharp-edged and serrated in front, grooved behind, about three fourths as long as the head, ending in a filament, situated little backward of the axil of the pectoral. Second dorsal fin very low and feeble, originating one length of the base of the first dorsal behind the latter. Anal fin more developed than the dorsal, first ray below the middle of the space between the dorsals. Pectorals small, three fifths of the length of the head, pointed. Ventrals small, first ray, with a long filament, as long as the head; bases situated backward of those of the pectorals, and forward of the base of the first dorsal. Scales moderate, imbricate, about thirty in a transverse series from the first anal ray to the first dorsal, six in a series from the lateral line to the dorsal fin. Each scale harsh with longitudinal series of spines, subequal in height, the median of which is longest. Nine or more series can be seen on a single scale of the flanks. The lateral line rises abruptly and reaches its greatest height below the middle of the first dorsal, whence it descends gradually.

Brown, the spines of the scales producing a pilose grayish brown appearance. Linings of mouth and body cavity black.

Description from a specimen of twelve inches in length. In the young the barbel is shorter, the caudal region more slender, the rostral angles are much more prominent, and the rostrum hardly extends beyond the mouth.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3393	7° 15′ N.	79° 36′ W.	1020 fathoms	36.8° F.	Gn. M.
3353	7° 6′ 15″ N.	80° 34′ W.	695 "	39° F.	Gn. M.
3354	7° 9′ 45″ N.	80° 50′ W.	322 "	46° F.	Gn. M.
3395	7° 30′ 36″ N.	78° 39′ W.	730 "	38.5° F.	Rky.

Macrurus gracillicauda sp. n.

Plate H, fig. 1.

Br. r. 7; D. 10–11 + ?; A. 143; V. 10–11; P. 25; Ltr. 5 + 24.

The shape is somewhat like that of *M. asper*, but there is rather more distinction between body and tail. Body and head massive; head convex on all sides, bluntly pointed or rounded off in front with a low prominence and the common rosette of small spines, curvature slight from nape to end of snout, crown nearly flattened transversely. The ridge below the eye is a trifle swollen, but not angular. Depth of body nearly one sixth and length of head about one fifth of the total length. Snout short, blunt, rounded, three fourths as long as the eye, length from intermaxillary one half the orbital length, prenarial angles scarcely noticeable. Suborbital ridge low, rounded, marked by rough scales along its lower edge, vanishing before reaching a vertical from the hind border of the orbit. Interorbital space very little arched, width four fifths of the length of the eye. Eye large, two sevenths of the head, three fourths of the snout. Mouth large, length one and one fourth times that of the eye; maxillary extending below four fifths of the orbit. Teeth small, in villiform bands, outer series on the upper jaws larger. Barbel as long as the eye, slender. Preopercular ridge bent backward to form a rounded loop at the lower angle. Gill rakers short, rounded, rough with small spines, anterior series small, seven to eight on the first arch. Second dorsal spine above the opercular angle, including the filament three fifths as long as the head. First ray of dorsal above the base of the pectoral, second ray beset with sharp prickles on the forward edge; base less than the length of the eye, distant from the second dorsal less than twice this length. Rays of second dorsal short, feeble. Origin of anal below the third scale behind the base of the first dorsal. Ventrals small, first ray with a filament, length equal the distance from tip of snout to hind edge of orbit. Caudal small, slender. Vent distant from the anal origin, close to the bases of the ventrals. Thirty-five pyloric appendages. Scales of medium size, harsh with sharp spines which rise in longitudinal series, in some cases of a dozen or more, the hindmost spines projecting backward from the edge of the scale like the teeth from a comb. On some scales the median series is somewhat larger than the others, though rarely producing the appearance of a keel. The head is covered with sharp scales, except on the lower surface, around the mouth, chin and throat. No bare space between the ventrals on the chest.

Described from a specimen ten and one half inches in length.

Black to brown, more often reddish brown on the muscular portions. The spines of the scales give the body a grayish tint in certain lights.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.
3385	7° 32′ 36″ N.	79° 16′ W.	286 "	45.9° F.	Gn. M.

Macrurus orbitalis sp. n.

Plate XLVII. figs. 1–1 b.

Br. r. 7; D. 11–12 + ?; A. 128; V. 9; P. 19–20.

Form compressed, elongate, tapering to very slender in the caudal extremity, depth four fifths of the length of the head, outline rising from the nape to the dorsal fin. Head one fifth of the total length; crown nearly straight from snout to nape; interorbital width four fifths of the length of the snout, space flattened or slightly concave; rostral ridge low. Snout four fifths as long as the eye, broader than the interorbital space, prominent in front of the mouth, with strong median and prenarial angles, from the latter of which the suborbital ridges spread somewhat to below the front of the eye, rarely to the ends at the preopercular border. Eye large, one and one fourth times the length of the snout, four thirteenths of the length of the head, or nearly one and two thirds times the width of the space between the orbits. Orbit appearing subcircular or deeper in the posterior half. Mouth small, inferior, subtending three fifths of the eye and one third of the snout. Barbel small, slender, two fifths as long as the eye. Teeth very small, subequal, in villiform bands. Preopercular ridge bent slightly backward in the lower third of its length. Origin of first dorsal above the base of the pectoral; second spine serrate; base descending rapidly backward from the first spine. Second dorsal low, feebly developed. Anal origin little backward of the base of the first dorsal. Ventral bases little forward of those of the pectorals; fin length equalling the distance from the end of the snout to the hind border of the orbit; first ray longest, with a filament. Scales covering the body and the upper surfaces of the head harsh to the touch, with series of sharp spines, up to eight or more series on a scale. The scales on the cephalic ridges and angles are especially rough. Vent nearer to the ventral bases than to the anal. Nineteen long pyloric appendages.

Blackish over the body cavity; reddish brown over the muscular portions of the caudal section; lighter to translucent on the head and snout; entire surface tinted with grayish, from the spinules of the scales. Fins light; first dorsal and pectorals tipped with black. Orbit surrounded by a narrow border of black. As the description is taken from small specimens it is to be expected that darker colors will prevail on larger individuals, in which case the orbital ring of black will be less conspicuous.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. M.

Macrurus loricatus sp. n.

Plate XLVII. figs. 2–2 b.

Br. r. 7; D. 12 + 144; A. 135; V. 11; P. 19–20.

Shape and proportions similar to those of *M. latirostratus*. Elongate, compressed, high and narrow at the base of the first dorsal, and straight from this point to the snout; caudal section tapering regularly to the slender extremity; depth more than one sixth of the total length. Head less than one fifth of the total, flattened over the interorbital region and the snout, angular anteriorly, convex over the opercles. Snout short, moderately broad, as long as the eye, or one and one fourth times the interorbital space, acute as seen from the side, viewed from above blunt with a doubled median and two prenarial prominences. Suborbital ridge prominent, rough, disappearing before reaching a vertical from the hind border of the orbit, forming a nearly straight line on the side from the back of the mouth to the end of the snout. The width across the anteorbital prominences equals that across the prenarial angles or one and one fourth times the width of the interorbital space. Eye large, one third as long as the head. Mouth small, maxillary reaching to or beyond a vertical from the middle of the eye. Teeth small, in villiform bands, in the outer series on the upper jaws a trifle larger. Barbel small, slender, one half as long as the eye. Origin of first dorsal above the bases of the ventrals, very little backward of that of the pectoral; second spine serrate, filamentary at the end, nearly as long as the head, compressed; base of the fin three fifths as long as the orbit, descending rapidly backward. Distance from first dorsal to the second nearly or quite twice the length of the base of the former. Second dorsal low, anterior rays weak. Anal origin little backward of the base of the first dorsal. Vent near the bases of the ventrals. Ventrals small, more than half as long as the head. The spinules on the second spine of the dorsal fin are numerous and closely set. Scales of medium size, firm, strong, harsh, with short, sharp, closely appressed spines in longitudinal series. On the flank as many as twelve series appear on a scale. There are seven scales in a row from the lateral line to the base of the first dorsal. Over the top and sides of the head and snout the scales form an armature quite as rough and heavy as on the body. Lateral line distinct, a narrow sharply defined groove. Specimens of ten inches and one half are sexually mature.

Black, in some cases shading to reddish brown on the top of the head and on the tail.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3409	0° 18′ 40″ N.	90° 34′ W.	327 fathoms	42.3° F.	Bk. S.
3410	0° 19′ N.	90° 34′ W.	331 "	44.2° F.	Bk. S.

Macrurus cuspidatus sp. n.

Br. r. 8; D. 11 + 155; A. 142; V. 11; P. 21.

Body and head compressed, depth through the abdomen one seventh of the total length, caudal portion long, thin, slender, tapering to a whip-like end. Head rather long, pointed at the snout, subtriangular in transsection, narrow across the top, two elevenths of the total length. Snout long, sharp, hardly as long as the eye, descending in front of the nostrils to the lateral angles which are not much pronounced and are situated nearer to the eye than to the end of the rostrum, arched from nostril to nostril. Interorbital space low, in width equal to three fifths of the orbital length. Eye large, a trifle longer than the snout, three tenths as long as the head. Mouth rather small, reaching backward of the middle of the eye. From the tip of the snout to the maxillaries about equal to the length of the eye. Teeth fine, in villiform bands, equal in the lower jaws, outer series larger on the upper.

Barbel small, slender, half as long as the eye. Nape high, slightly arched, outline from nape to snout almost straight. Suborbital ridge moderately prominent, not sharp, reaching a vertical from the hind border of the orbit.

Origin of the first dorsal above the axils of the pectorals; first spine small; second spine longest, slender, with close-set spinules and a long filament; base not descending very rapidly backward. Origin of second dorsal twice the length of the base of the first behind the latter; rays short and feeble anteriorly. Anal well developed, origin forward of the middle of the space between the first and second dorsals, backward from the operculum half the length of the head. Vent nearer to the bases of the ventrals than to the anal. Ventrals small, hardly reaching to the anal, first ray with a filament. Scales medium in size, harsh with series of spinules more or less convergent backward toward the median series which is largest on the scales of the back; seven scales between the lateral line and the base of the first dorsal.

Head rusty brown, abdomen black, back and tail brown, possibly tinted with purple in life; linings of mouth and body cavity black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3436	27° 34′ N.	110° 53′ 40″ W.	905 fathoms	37.2° F.	Br. M. bk. Sp.

Macrurus convergens sp. n.

Plate XLVIII. fig. 1.

Br. r. 7; D. 11 (10–12) + 135; A. 109; V. 11; P. 21.

In this species the body and head do not present such a swollen appearance as those of either *M. liolepis*, *M. anguliceps*, or *M. carminifer*. From the pectorals backward to the end of the tail the decrease in size is very regular. The body is compressed and its greatest depth is about one seventh of the total length. Head compressed, three fourths as wide as high, convex on the sides, flattened on the crown, pointed on the snout. Snout prominent, nearly as long as the eye, the length to the orbit equalling that to the intermaxillary; median angle prominent, prenarial angles low, each ending in a group of spines. Interorbital space three fifths as long or four fifths as wide as the snout, very little concave transversely. Eye large, as long as the snout, two sevenths as long as the head. Suborbital ridge low, rounded, more distinct forward, not extending backward of the eye, harsh with spiny scales. Mouth small, subtending the anterior two thirds of the eye. Barbel small, half as long as the eye. Teeth small, in short narrow villiform bands; outer series a little larger on the upper jaws. Preopercular ridge slightly bent backward at the lower end. Base of first dorsal two thirds as long as the space behind it; first ray short, above the axil of the pectoral; second ray three fourths as long as the head, with numerous serrations. Second dorsal very feebly developed. Anal fin moderately strong, originating little farther backward than the last spine of the first dorsal, distant from the vent. Pectorals and ventrals small; the latter little longer than the eye, ending in a filament. Caudal slender, ending in a tuft of about four rays. Vent between the ventrals, nearer to their bases than to the anal.

Scales rough with keel-like series of small sharp spines; the outer series are somewhat convergent backward to the stronger median series. On the larger scales of the flank there are ten or more of the keels. Between the lateral line and the dorsal there are six scales.

Belly black, muscle tracts lighter and tinted with reddish, lighter above the upper portions of the skull.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3357	6° 35′ N.	81° 44′ W.	782 "	38.5° F.	Gn. S.
3393	7° 15′ N.	79° 36′ W.	1020 "	36.8° F.	Gn. M.

Macrurus latirostratus sp. n.

Plate XLVIII. fig. 2.

Br. r. 7; D. 12 + 120; A. 110; V. 10; P. 19–20.

Elongate, compressed, greatest depth one sixth of the total length, tail slender and threadlike toward the end. Head less than one fifth of the total, nearly as wide as high, broad and angular forward, flattened or slightly concave on the crown. Snout wider across the prenarial angles than long, length one fourth more than the width of the interorbital space, or one fifth less than the length of the orbit. As seen from above, the angle at the tip of the snout is quite blunt and extends little farther forward than the prenarial angles. From the latter the low ridges backward form an acute angle at the occipital crest. The suborbital ridges are moderately prominent and end about midway from the orbit to the preopercular edge; from the lateral angles of the rostrum the ridges diverge gradually in nearly straight lines. Eye large, longer than the snout, nearly one third longer than the distance across the interorbital space, little longer than the distance from the end of the snout to the maxillaries, one third of the length of the head. Mouth small, cleft to a vertical from the middle of the eye. Teeth very small, subequal, in villiform bands. Barbel small, slender, one half as long as the eye. Median rostral ridge hardly rising higher than the narial ridges, ending at a line joining the front edges of the orbits. Upper edges of the orbits scarcely rising above the forehead. Origin of the first dorsal above the axil of the pectoral; second ray serrate, with a filament, nearly three fourths as long as the head; base descending rapidly backward. Second dorsal separated from first by less than two lengths of the base of the latter, low, feebly developed, widest near mid-length. Ventrals small, more than half as long as the head, first ray prolonged in a filament, origin a little forward of the bases of the pectorals. Pectorals larger than the ventrals, three fourths as long as the head. Vent distant from the anal, near the bases of the ventrals. Anal origin farther backward than the base of the first dorsal by about the width of two scales. Preopercular ridge bent forward in the middle, or rounded backward in the lower portion. Occipital crest prominent. Scales rather harsh, with longitudinal series of small spines, up to eight or more rows on each scale. Spinules on the second spine of the first dorsal less numerous on young specimens, absent to some extent near the base. Frequently on very young there are two or three spinules in a group near the base of the spine separated from the upper ones.

Black on the abdominal chamber; blackish to reddish brown over the muscular portions, shading to lighter over the mucous cavities on the head.

Distinguished from *M. convergens* by a shorter broader snout and by the fin rays; on that species the median rostral angle is sharper.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21 N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.
3384	7° 31′ 30″ N.	79° 14′ W.	458 "	42° F.	Gn. S.
3354	7° 9′ 45″ N.	80° 50′ W.	322 "	46° F.	Gn. M.

Macrurus anguliceps sp. n.

Plate G, fig. 1; Plate L, skull; Plate LXXXIII. fig. 2, Lat. Syst.

Br. r. 6; D. 10 (11) + 112; A. ca. 115; V. 8; P. 21.

Body compressed, slender and whip-like posteriorly, depth two thirteenths, head one fifth, and snout to anal one third of the total length.

Length of the body cavity one and four fifths times the length of the head. Head at the nape three fifths as wide as high, moderately convex on the sides, slightly concave or nearly flat on the crown. Snout wide, shovel-shaped and pointed and bearing three prominent angles at the end. Prominent suborbital, narial, and rostral keels, and a prominent orbital ridge on the upper and hinder half of each orbit. The snout is quite prominent and is wider than the interorbital space; the rostral ridge is high between the nostrils; the narial ridges curve outward anteriorly and each ends in a blunt angle which like the median is crowned by a group of small teeth-like spines; its length is one and one fourth times that of the eye, one and one half times the width of the interorbital space, which latter equals the distance from the intermaxillary to the end of the snout. Eye large, four fifths of the snout, two ninths of the head. Mouth small, anteriorly at a vertical from the middle of the snout, not reaching backward as far as the middle of the eye. Teeth small, in bands, outer series in the upper jaws larger. Barbel small, less than half as long as the eye. Suborbital ridge hardly reaching to midway from the eye to the preopercular ridge. Preopercular ridge much curved and bent backward in a rounded loop toward the lower end. Nape high. Second spine of the dorsal thickly set with prickles or spinules on the front edge, grooved on the back, compressed, equalling in total length three fifths of that of the head, ending in a flexible filament, inserted above the axil of the pectoral. Posterior rays of the first dorsal short; commonly there are ten rays in this fin, rarely there are nine or eleven. Second dorsal low; anterior rays very small; base distant from that of the first less than the length of the latter. Ventrals small; origin below second dorsal ray; first ray with a filament, making its total length nearly one third of that of the head; number of rays usually eight, rarely seven. Anal much more developed than the second dorsal, longest rays equal the width of the eye. Vent close to the origin of the anal fin, below the origin of the second dorsal. Tail slender, thread-like. Pectorals small, half as long as the head, pointed.

Scales harsh to the touch, with keel-like longitudinal series of low spines of which there are nine or more on the wider ones; about five scales between the lateral line and the dorsal fin. The groups of spines on the rostral angles are rosettes in which the lines or series radiate from a common centre.

Length of the specimen described thirteen and one half inches.

Light greyish brown, tinted with light yellowish green or olive; linings of the body cavity black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 fathoms	36.8° F.	Gn. M. S. rky.
3353	7° 6′ 15″ N.	80° 34′ W.	695 "	39° F.	Gn. M.
3371	5° 26′ 20″ N.	86° 55′ W.	770 "	39° F.	Glob. Oz.
3376	3° 9′ N.	82° 8′ W.	1132 "	36.3 F.	Gy. glob. Oz.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 "	36.4 F.	Hard
3400	0° 36′ S.	86° 46′ W.	1322 "	36° F.	Lt. gy. glob. Oz.
3435	26° 48′ N.	110° 45′ 20″ W.	859 "	37.3° F.	Br. M. bk. Sp.
3366	5° 30′ N.	86° 45′ W.	1067 "	37° F.	Yl. glob. Oz.

Macrurus latinasutus sp. n.

Br. r. 6; D, 10 + ?; A. mutil.; V. 8; P. 17.

Moderately elongate, compressed, tapering regularly from the body to the attenuate extremity of the tail. Head near one fifth of the total length, depth about two thirds of its length. Snout as long as the orbit, broad at the end, width one and one half times that of the interorbital space, median angle prominent, ridges from the lateral angles passing over the orbits converging regularly to the occiput; tip surmounted by a few sharp spines hooking backward; lateral angles not prominent. Suborbital ridge pronounced, subtending the orbit. Eye of medium size, as long as the snout, one and one half times the width of the interorbital space, prominent. Bones of the skull firm, muciparous excavations large. Skull concave between the eyes and rising to each orbit in a strong edge. Median rostral ridge well developed reaching back upon the interorbital area. Mouth rather small; maxillary extending below half of the eye. Teeth small, in villiform bands, outer series larger anteriorly. Barbel small, less than half as long as the orbit. Origin of the spinous dorsal above the axil of the pectoral; first spine small; second spine largest, strong, anterior edge with sharp close-set spinules, apex with a filament, hinder rays short. Second dorsal low, feebly developed anteriorly, origin about one length of the eye backward of the base of the first dorsal. Anal stronger than second dorsal and originating a little nearer the head. Vent below the space between the dorsals, close to the first anal ray. Ventrals small below the axil of the pectorals, outer ray with a filament reaching to the anal. Scales medium, bristling with spinules arranged in longitudinal series; those on the top of the snout are the strongest. Fourteen pyloric cæca. Stomach filled with portions of shrimp-like crustacea.

Head dingy white, in life red to purple; muscular portions of body and tail reddish brown; belly blackish; branchial chamber and abdomen lined with blackish to silvery.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3431	23° 59′ N.	108° 40′ W.	995 fathoms	37° F.	Lt. bro. M. Glob.

Macrurus trichiurus sp. n.

Br. r. 7; D. 11 + ?; V. 8.

The shape in this species is much like that of *M. convergens*, from which it may be distinguished by the smaller number of rays in the ventrals, the few serrations on the second dorsal spine, and by the great length and slenderness of the caudal section. Body compressed, caudal extremity very slender, threadlike. Head two thirteenths of the total length. Snout broader than the interorbital space, the ridges of the top diverging forward to the two prominent lateral angles; median angle protruding, apex equidistant from orbit or maxillaries; length equal to three fifths of that of the orbit. Orbit large, two and two thirds times in the length of the head, half of the interorbital space. Suborbital ridge prominent, sharp, subtending the entire orbit. Mouth medium; maxillary extending below two thirds or more of the orbit. Teeth small, equal, in villiform bands. Dorsal origin above the base of the pectoral; first spine short; second spine longest with a filament and three or four spinules. Second dorsal low, feeble. Origin of anal slightly backward of the hind end of the base of the first dorsal. Vent a short distance forward of the first anal ray, opposite the midlength of the ventral fins. Ventrals small, originating somewhat farther backward than the dorsal, below the bases of the pectorals. Pectorals small, two thirds as long as the head. Scales small, anteriorly in the median line each bears a short spine and directly behind this a larger one extended out and backward beyond the scale margin. Toward the back some scales have an additional, and shorter, row of spines on each side of the median, the three rows diverging backward.

Black; muscular portions lighter, reddish brown.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.

Macrurus tenuicauda sp. n.

Plate XLIX. fig. 1.

Br. r. 7–6; D. 10–9 + ?; A. ca. 141; V. 8; P. 25.

Form somewhat like that of *M. filicauda* Günt., but more slender, with wider and longer snout, larger eye, smaller mouth, and rough scales. Body compressed; tail very slender; total length about five times the length of the head, nine times the greatest depth, or nearly four times the distance from the end of the snout to the first anal ray. Head rather elongate, about as wide as high, subtriangular in transverse section, narrow and convex across the nape or the crown, wide and sharp-angled at the suborbital ridge and the rostral edges, broad and pointed forward. Snout prominent, sharp pointed, wide across the lower surface, which is flat and straight, arched across the top, with pronounced angles in front of the nostrils each like the median angle bearing a small bunch or rosette of spines. Orbital ridges diverging and turning abruptly outward in front of the nares, with branches backward as if to meet at the nape in an acute angle. Length of snout one and one third times that of the eye. Interorbital space convex transversely; crown straight from the nape to the end of the snout. Eye large, hardly three fourths as long as the snout, four fifteenths of the length of the head. From the end of the snout to the intermaxillary is not much less than from the same point to the eye. Mouth small, inferior; the end of the maxillary subtends three fifths of the eye. Teeth very small, in short villiform bands, subequal; those of the lower jaws crowded near to the symphysis. Suborbital angle prominent, sharp, continued to the preopercle. Branchiostegal rays commonly seven, frequently six; in each case there are seven either on one side or the other or on both sides. Barbel very small, slender, nearly one fourth as long as the eye. The rostrum has the appearance of bifurcation at the tip. First dorsal with nine or ten rays, anterior above the axil of the pectoral, second with prominent and sharp prickles; base about as long as the eye, or the interspace between the dorsals. Second dorsal low and feeble. Anal well developed, originating below the hind extremity of the base of the first dorsal. Vent at two thirds of the distance from the bases of the ventrals to the base of the anal. Pectorals and ventrals small, bases of the latter below those of the former. Tail slender and thread-like backward. Scales medium, rough, with four to five equal keels each of which bears minute serrations or spines. Cephalic ridges roughened with similar spines. Top of head and snout covered with scales; lower surface of head, below the snout and the suborbital ridge, naked.

Description taken from an eight inch specimen.

Black on opercles, chest, and belly; white over the mucous chambers, from the crown and the suborbital region forward to the end of the snout; blackish tinged with red on the muscular tracts.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14 W.	458 fathoms	42° F.	Gn. S.

This species appears to be somewhat closely allied to *Coelocephalus acipenserinus* Gilb. and Cram.; it differs in length of snout, size of eye, and carinæ of scales.

Macrurus canus sp. n.

Plate XLIX. fig. 2; Plate LXXXIV. figs. 1, 2, Lat. Syst.

Br. r. 6; D. 11 + 105; A. 107; V. 7; P. 19–21.

The form in this species resembles that of *M. parallelus* Günt., but the snout is shorter and there are marked differences in the fins; as, for instance, in the anal, which originates much in advance of the second dorsal. The body is compressed, in depth one sixth of the total length, and the caudal region is slender. Head compressed, angular, one fourth of the total, sharp at the snout, scales rough. Snout medium, one third as long as the head, more than the length of the eye or the width of the interorbital space, sharp pointed, translucent, sharp-edged at the sides, with a low rostral keel extending back to the interorbital space. Skull with a short ridge at the nape, one at each side of the parietal region, and one above each orbit to the upper angle of the operculum and to the rostral edge. These last with the suborbital ridges, which have nearly the entire length of the head, serve to protect the well developed mucous chambers. There is also a ridge around each nasal chamber. The parietal ridges turn outward at the nape. The distance from the end of the snout to the intermaxillaries equals that to the orbit. Mouth small, inferior; maxillary extending below three fifths of the orbit. Teeth small, subequal, in villiform bands. Barbel small, one third of the length of the eye. Between the ridges the frontal region is slightly concave. Eye large, two sevenths as long as the head, shorter than the snout, equal to the width of the interorbital space. Cheeks vertical to slightly convex. Mucous cavities of the head very large. A circular space free from scales on the chest between the ventrals. Dorsal origin above the upper angle of the opercle, little forward of the bases of the pectorals; number of spines usually eleven, rarely ten; second spine smooth, including the filament it is three fifths as long as the head. Spines of the second dorsal weak and small; origin of the fin distant from the first dorsal hardly less than the length of the latter's base. Anal origin little farther backward than the base of the first dorsal. Ventrals small, first ray with a filament, equal in length to the distance from the tip of the snout to the middle of the eye, inserted at the lower angle of the opercle. Caudal filamentary when complete. In most cases it is truncate at the base, which bears a group of rays, of varying number, terminating in a pencil point. The tuft on the tail gives a completed appearance to that organ, but the length of the caudal section varies greatly; on six specimens there are respectively, 58, 70, 76, 81, 103, and 105 rays in the second dorsal, and 61, 74, 78, 83, 106 and 107 in the anal fins. Only about one in six is entire. Pectorals small, more than half as long as the head, inserted a little backward of the ventrals or of the origin of the dorsal. Vent close to the anal fin. Scales medium, rough with several to five or more spinose ridges which are divergent backward; five scales between the lateral line and the dorsal fin. Pyloric appendages ten. Females of six and one half inches have both ovaries developed and filled with eggs that are nearly or quite mature.

Sides of the muscular regions flesh color to brown, darker on the back, with more or less of silver especially on the sides of the body chamber. Belly from anal to chin blackish. Entire head translucent (possibly luminous), silvery, around eyes and gill openings showing blackish as from within. Forward ends of rostral angles blackish. Puncticulations of brown are irregularly scattered or grouped everywhere over head and body.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 “	48.8° F.	Gn. M.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 “	55.8° F.	Gn. M.

Trachyrhynchus helolepis.

Trachyrhynchus helolepis Gilb., 1891, P. U. S. Mus., 562.

Plate G, fig. 2; Plate LI., skull.

Br. r. 7; D. 11 (11–10), + ca. 113; A. ca. 107; V. 7–6; P. 23.

Depressed and acute anteriorly; compressed, narrow and tapering to a slender extremity in the posterior half. Head one fifth wider than deep, sharp pointed at the snout, little less than one third of the total length, flat on the crown, arched across the middle of the snout, nearly straight on the top from the nape forward. Suborbital ridges thick, rounded, prominent, extending from the snout to the base of the pectoral, descending a little across the operculum. Snout nearly twice as long as the orbit, much wider than deep, sharp. Eye large, about as long as the width of the interorbital space, little more than half as long as the snout. Interorbital space flat, on a level with the balance of the crown. Mouth large, distance of intermaxillaries from the tip of the snout close upon one and one half times the length of the orbit, maxillary extending below nearly the whole of the orbit. Teeth equal, small, sharp, numerous, in villiform bands. Barbel small, one fourth as long as the eye. Gill rakers 5 + 19–20; laminæ short.

First dorsal originating above the base of the pectoral, base five sixths of the orbital length. Second dorsal separated from the first by a space as long as the barbel. Origin of the anal backward from the head less than half the length of the latter, below the eleventh ray of the second dorsal. Vent close to the anal. Ventral bases below the forward edges of the operculum; fins but a trifle longer than the orbit, midlength lying below the origin of the pectorals, second ray longest, with a filamentary prolongation. Body, head, and snout covered with very harsh spinose or keeled scales; each of those on the body is provided with a strong, erect, more or less irregular and angled spine, while those of the head and of a series at each side of the base of the dorsal and of the anal have a longitudinally compressed serrated keel and are with or without additional and less developed spines. The number of spines on each scale varies considerably on any part of the body. Excepting the fins, the only bare spaces on the body are on the gill membranes and between the lower jaws. With age the spine on the scales of the flank takes the appearance of a vertical (transverse) keel, the spine proper forming a ridge on its forward side.

Dingy brownish in the alcohol. In life having a reddish tint overcast with more or less of blue.

In some respects these specimens do not agree with Gilbert's description. The differences, however, do not appear sufficiently great to warrant the establishment of a new species. The type of *T. helolepis* was taken by the "Albatross" at "Station 2818, in deep water off the coast of Central America."

Compared with *T. trachyrhynchus* from the Mediterranean this species is more massive forward, less pointed on the snout, and has a larger mouth and a broader forehead.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
2818	0° 29′ S.	89° 54′ 30″ W.	392 fathoms	43.9° F.	Wh. and bk. S.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 "	42.3° F.	R. Glob. Oz.

PLEURONECTOIDS.

The marine "Flat Fishes" are somewhat generally distributed in all seas, with the possible exception of those around the poles. They live quite at the bottom, are active, strong swimmers and apparently have maintained themselves at the upper levels of the ocean floor better than more sluggish forms. None of them have yet been taken from so great a depth as one thousand fathoms. In fact they have hardly been ranked with the deep sea fishes; but the vertical range has been carried farther down by each succeeding expedition until it is no longer possible to exclude them. The deepest record of any of the species is that of *Citharichthys dinoceros* G. B., of 955 fathoms, in the West Indies. The nearer approaches to this are *Limanda Beanii* Goode, at 896, and *Glyptocephalus cynoglossus* Linné, at 858 fathoms, both from the northwestern Atlantic. In the northeastern Atlantic, *G. cynoglossus* is noted by Günther at 732 fathoms, and *Solea profundicola* Vaill. was taken by the "Talisman" at 684 fathoms. The greatest depth assigned a member of the family in the northeastern Pacific is that of *Embassichthys bathybius* Gilb., taken by the "Albatross" at 603 fathoms in the Santa Barbara channel. The greatest reported in the northern part of the Indian Ocean from the "Investigator" collections are *Symphurus Wood-Masoni* Alc. at 490, and both *Symphurus septemstriatus* Alc. and *Poecilopsetta prælonga* Alc. at 400 fathoms. At present more than fifty species are known to occur at depths greater than one hundred fathoms; of these, twenty are on record from more than three hundred, seven at more than five hundred, and three at more than eight hundred fathoms. Though the vertical range has been thus extended downward no special deep sea characters distinguishing bathybial from shoal water species would appear to have been acquired. Luminous organs, obsolescent eyes, or special organs of touch, other than elongate fin rays, have not yet been discovered in the family. The majority of the species known to descend below three hundred fathoms from the surface are found to range upward to depths of a hundred and fifty fathoms or less, thus bringing themselves among the shoal-water forms. This will be made sufficiently clear by examination of the list with least and greatest depths. *Glyptocephalus cynoglossus* is a marked instance, ranging as it does from a depth of less than a hundred fathoms to one of more than eight hundred.

That there was a comparatively recent connection between the Pacific and the Atlantic across the isthmus, and that separation of the two oceans affected the shoal water forms more recently than the forms of the deep sea is favored by the representatives of the Pleuronectidæ in this collection. Close affinities exist between the species of Citharichthys, Platophrys, Symphurus, and Monolene from opposite sides of the isthmus. These relationships are especially noticeable in the species of Symphurus and even more so in those of Monolene, *M. maculipinna* and *M. sessilicauda*, for instance. Type specimens of *M. sessilicauda* at hand have forty-five vertebræ, as in *M. maculipinna*, instead of forty-three as was originally stated in the generic diagnosis.

In the "Challenger" Report, published in 1887, Dr. Günther gives a list of nineteen species of Pleuronectoids known to occur at depths greater than one hundred fathoms; the works of the "Talisman," the "Albatross," and the "Investigator" have since increased the list so that it now contains fifty-five species.

PLEURONECTIDÆ.

Hippoglossina vagrans var. n.

D. 59–60; A. 44–47; V. 6; P. 11 on each side; C. 17; Ll. 73–77; Ltr. 21–22 + 23–26.

Body sinistral, compressed, greatest depth near midway from snout to base of caudal about one third of the total length, profile outlines on dorsal and ventral edges curving regularly from the deepest portion forward to the eyes and backward to the caudal pedicel. Head two sevenths of the entire length, with a narrow sharp ridge separating the eyes, with a prominent angle below the symphysis of the lower jaws and another below the angular, and with a wide indentation in front of and encroached upon by the upper eye. Snout hardly three fifths as long as the eye, lower jaw longer. Mouth wide; maxilla with a low prominence anteriorly, reaching backward of the middle of the left eye. Nostrils small, left pair in front of the interorbital space; anterior one of each pair with a dermal prolongation. Eye large, nearly two sevenths of the length of the head, lower very little less advanced than the upper. Teeth small, right anterior larger, in a single series. Gill rakers moderately elongate, strong, sharp, three on the upper section of the forward edge of the first arch and nine on the lower. Lateral line making a regular upward curve above the pectoral three times as long as high; straight from the tip of the pectoral backward.

Pectoral on each side with eleven rays, half as long as the head. Dorsal and anal rays shorter and forming fringes anteriorly; dorsal origin at the forward portion of the right eye; anal origin below the base of the pectoral; anal preceded by a short procumbent spine; caudal longer in the median rays, blunt, separated from dorsal and anal by a space equal to the length of the snout; left ventral longer.

Scales small, larger along the middle of the flank, small on the head near the bases of the fins and on the fin rays, absent from the snout.

Grayish-brown with transverse cloudings of darker; with numerous small spots of light color edged with black on the left side, forming one or two longitudinal series on dorsal and anal, a couple of tranverse series on the caudal, and three or four still more irregular series on the flank. Right side uniform flesh color. Left pectoral with a couple of transverse bands of brown. The fins and flank are more or less freckled with brown. In cases there are several transverse bands, or five or six narrow streaks, on the left side.

Agreeing tolerably with the species *H. Bollmani* Gilb. in numbers of fin rays, but possessing a larger number of rows of scales between the lateral line and the dorsal and somewhat different markings.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 fathoms	58.4° F.	Rky.

Engyophrys Sancti-Laurenti.

Engyophrys Sancti-Laurenti J. B., 1889, P. U. S. Mus., XII., 176.

D. 89; A. 73; V. 6; P. l. 12, r. 10; C. 17; Ll. 67; Ltr. 22 + 26.

Form a sinistral much compressed suboval in which the greatest depth is one half and the length of the head one fourth of the length from the snout to the base of the caudal. An indentation of the outline in front of the upper eye is partly filled by the bony orbit on the ridge of which there are two or three short spines. The orbital ridge is prominent around the hinder half of the upper eye; between the eyes the ridge from the forward half of the lower eye includes a prominent spine behind which the ridge is less elevated. Other angles of prominence on the head are that below the snout, that in front of the lower orbit, and that below the angular. Snout blunt, half as long as the eye. Mouth small; maxilla curved, left reaching to a vertical from the forward edge of the eye. Teeth small, hooked, in a single series on the right jaws, absent from the left. Eyes large, twice as long as the snout, one third of the length of the head, close together, separated by a narrow space with a sharp ridge which is divided in the middle; upper eye directly above the lower. Left anterior nostril small, with a short valve; right with a larger valve or flap. A membranous extension from the opercle above the base of the pectoral. Gill rakers six, short, thick, pointed, on the lower part of the arch. Lateral line bent anteriorly, much as in Monolene; bend comparatively short, two and one half times as long as high, nearly straight for a short distance on the top, descending farther and less rapidly backward. A sharp pelvic angle. No anal spine-like process. Scales medium, ctenoid on the left side, cycloid on the right. Dorsal and anal with shorter rays anteriorly, fringed in the greater portion of the length. Dorsal origin on the right side near the nostril; anal orgin below the base of the pectoral. Ventrals of six rays; left fin slightly farther forward. Left pectoral half as long as the head, with one or two rays more than the right. Caudal pointed, four fifths as long as the head, free from dorsal and anal.

Left side clouded dark brownish; fins blackish; caudal with a transverse series of three black spots, the median farther backward; pectoral blackish toward the ends; right side uniform flesh color.

The blind side of these specimens has none of the markings ascribed to the types from which the original description of *E. Sancti-Laurenti* was drawn by Jordan and Bollman. As the types were much smaller than the present individuals, it would appear from the latter as if the gridiron marks were lost in age. These authors give cycloid scales as a generic character; our specimens have ctenoid scales on the left side on which the combs have comparatively few and fragile teeth.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 "	62.6° F.	Fne. gy. S. G.

Citharichthys maculifer sp. n.

D. 85; A. 65–67; V. 6; P. 12 r., 10 to 11 l.; Ll. 57–59; Ltr. 16 + 19.

Sinistral; lower outline of profile similar to the upper, more curved in the anterior half of the length; depth four elevenths and length of head three thirteenths of the total length. Snout three fourths as long as the eye; chin descending backward; jaws even. A slight indentation in the outline of the forehead in front of the right eye. Interorbital space one fourth as wide as the eye, a longitudinal groove widening forward, with a bony ridge at each orbit, left much stronger. Eyes medium, three elevenths of the length of the head, one and one third times the length of the snout, left slightly in advance of the right. Nostrils small, close together; anterior smaller, with a pointed dermal fold. Mouth medium, asymmetrical, curved; maxillary crooked, hind corner near a vertical from the middle of the eye. Teeth small, hooked, larger forward, a pair of small canines on the intermaxillaries. Gill rakers short, strong, two plus seven.

Lateral line nearly straight, slightly curved above the pectorals.

Scales rather small, ctenoid on the left side, cycloid on the right, absent from the snout.

Pectoral fins small, left containing one to two rays more than the right. Rays in dorsal and anal shorter anteriorly, exserted and forming fringes in more than half of the fins; dorsal origin on the right side near the posterior nostril, fin little if any deeper than the anal. Anal origin below the bases of the pectorals. Ventrals small; right farther from the edge, farther forward and larger than the left. Caudal blunt or rounded on the hind margin.

Grayish brown, with numerous ocellate spots of bluish and of brownish on body and fins. Left pectoral with a brownish band across the basal portion and a broader one near the end. Caudal with the brown spots in irregular transverse series. The above description is taken from a specimen five inches in length.

On an eight inch individual the snout is almost as long as the eye, and the length of the left pectoral is contained one and three fourths times in the length of the head. This specimen bears three or four badly defined and faint transverse bands of brown, and the whole is grayish freckled with small spots of white (? blue) and of brown.

The temptation to place this form as a variety of *C. xanthostigma* Gilb. is great, though that species is said to have fewer rays in the pectorals, fewer scales, and no canines.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 fathoms	58.4° F.	Rocky.

Platophrys leopardinus.

Rhomboidichthys leopardinus Günt., 1862, Cat., IV., 434.

D. 88–92; A. 67–70; V. 6; P. 11 l., 10 r.; C. 17; Ll. 86–92; Ltr. 35–37 + 40–44.

Sinistral, much compressed, greatest depth contained twice to two and one sixth times in the total length. Head deeper than long; length four and three fifths times in the total; forehead concave about the nostril, in the profile and between the eyes. Interorbital space varying in width from that of the eye with half of the upper eye above the lower to twice as wide with little or none of the upper eye directly above the lower; slightly concave, with a low ridge in a strip of naked skin from the forward portion of one eye to that of the other. Snout shorter than the eye, blunt, with a more or less prominent bony, in cases spine-like, process on the left side. Mouth short, curved, cleft reaching below the anterior border of the eye. Teeth small, in two or more series, outer on the maxillæ little larger. Eyes large, two sevenths as long as the head, one and one half times the length of the snout. A tubular nostril forward of the orbital ridge above the lower orbit. Gill rakers short, small, tubercular, seven plus eight. Lateral line with an abrupt curve above the base of the pectoral as long as the orbit and as high as the eye.

Scales small, ctenoid on the left side, cycloid on the right, eighty-two to eighty-five in a series from the head to the bases of the caudal rays.

Dorsal origin on the right side near the nostrils; anal origin slightly forward of a vertical from the hinder margin of the operculum; dorsal little deeper than anal; anteriorly on both fins the rays protrude beyond the membrane, forming a fringe. Pectoral of the left side larger, longer; that of the right side with fewer rays and shorter. Left ventral more than twice as long as the right and extending forward to the isthmus; right ventral narrow, opposed to the hinder part of the left.

Grayish brown, with numerous whitish spots on body and fins. Some of the spots are ocellate and probably were bluish in life. On the lateral line there are one to three ill-defined large blotches of dark brown, one near the middle and another near each end of the straight portion of the line. There are three parallel series of small oblong spots of blue in front of the interorbital space from the snout to the space in front of the upper eye.

On a specimen from Acapulco the three spots on the lateral line are partly divided so as to form three pairs; there are brown spots at each side of the median series, and five rather indefinite spots on the hinder halves of dorsal and anal.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3368	5° 32 45″ N.	86° 54′ 30″ W.	66 fathoms	58.4° F.	Rky.

Monolene maculipinna sp. n.

Plate LII. figs. 1, 2.

Br. r. 7; D. 98–102; A. 80–85; V. 6; P. 16 (to 14); Ll. 106–112 (plus 3 to 5) Ltr. 26 + 37; Vert. 45.

Resting on the right side, moderately elongate, three elevenths as deep as long, much compressed. Head less than one fourth of the total length, angular at the snout and behind the lower jaws, and indented above the nostrils. Snout two thirds as long as the eye, with a prominence above the end of the maxilla and another sharper one below the symphysis of the lower jaws. Eye large, two sevenths of the length of the head and one and one half times that of the snout; lower eye but little farther forward. Interorbital space very narrow, traversed by a sharp ridge which curves upward behind the upper eye and downward in front of the lower. Mouth of medium size, asymmetrical, curved; maxilla widened backward, rounded on the corners. Teeth small, subequal, little larger forward. Gill rakers short, strong; five to six shorter ones on the upper section of the first arch, and six to seven larger, plus four or five rudiments, on the lower. Edge of preoperculum free. The height of the curve in the lateral line is about half of the length of the eye; its length is about two and one half times its height at the forward end; superiorly the curve is much depressed and posteriorly it is longer and descends to the middle of the side. Nostrils small, close together; posterior on the left side small, pore-like, anterior with an acute angled flap or valve which is prolonged in a short filament; those on the right, the blind side, very small, hardly to be distinguished from the pores.

Vent and genital aperture on the blind side, a short distance from the edge. Scales small; those on the left side are ctenoid, the comb being of exceeding fineness; those on the right side are cycloid; and those on the head are smaller and extend forward to the nostrils and to the mouth. In addition to the scales counted on the lateral line the series contains several on the base of the caudal.

Dorsal descending on the right side of the head to the origin of the fin near the nostrils; base terminating opposite the end of the base of the anal, close to the base of the caudal. Anterior rays of dorsal and anal shorter, protruding beyond the membrane. Anal origin slightly in advance of the base of the pectoral; no anal spine. Ventrals small, of six rays, that of the left side about one ray in advance; a strong compressed pelvic spine. Pectoral little more than half as long as the head; no pectoral on the blind side. Basal portions of the fin rays scaly.

Left side a clouded brown, darker along the lateral line; caudal blackish in the hinder two thirds; pectoral light brown at the base and black in the greater portion of the length with several obliquely placed more or less elongate spots of white; right side colorless, except where the brown pigment shows through the fins. Young specimens are much lighter and show a black streak along the inner ends of interneurals and interhæmals. One at hand has small spots of darker scattered over the body; it has the hinder half of the caudal blackish, the anterior half of the pectoral white, and the posterior half of the pectoral black with a white spot in the middle. Largest specimen seven inches in length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh
3378	3° 58′ 20″ N.	81° 36′ W.	112 "	55.9° F.	Brk. Sh.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fne. gy. S.
3389	7° 16′ 45.	79° 56′ 30″ W.	210 "	48.8° F.	Gn. M.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Gn. M.

Monolene dubiosa sp. n.

D. 82; A. 63; V. 6; P. 12; Ll. 83; Ltr. 21 + 28.

Sinistral, broadly rounded in the anterior profile with a shallow indentation above the nostrils, much compressed, depth three eighths of the total length. Head one fourth of the entire length, without conspicuous angles. Snout shorter than the eye, blunt, much less prominent than that of *M. maculipinna.* Eye small, one and one half times the length of the snout, nearly one sixth of that of the head. The upper eye is a little forward of the lower, but this no doubt changes with age so as to bring the lower eye in advance in larger specimens. Mouth small, asymmetrical, strongly curved. Interorbital ridge low.

Anteriorly the height of the curve in the lateral line equals the length of the eye; superiorly the curve forms a nearly straight line, the length of which, from end to end of the curve, is about twice the height in front; posteriorly the height is greater, and the descent more oblique.

Dorsal origin on the blind side, behind the nostril. Anal origin below the base of the pectoral. Pectoral small, one third as long as the head. Ventrals small, of six rays, below the opercle. Caudal deep, two thirds as long as the head, median rays longest, base narrowly separated from the bases of dorsal and anal.

The specimen is a young one, measuring but two and three fourths inches in length, which will probably account for the regular curvature in the profile and for the situation of the vent on the edge of the body.

Brownish; edges of scales darker; dorsal and anal brown with lighter to whitish maculæ; caudal light with puncticulations of blackish; pectoral black in the posterior half of its length.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3422	16° 47′ 30″ N.	99° 59′ 30″ W.	141 fathoms	53.5° F.	Gn. M.

Symphurus varius sp. n.

D. 95; A. 79; V. 4; C. 12; Ll. 120–124; Ltr. 56.

Rather closely allied to *Symphurus atramentatus* and to *S. microlepis*. Body elongate, compressed, depth three elevenths and length of head four nineteenths of the total length. Snout short, one and one third times as long as the eye. Mouth small, curved, asymmetrical; maxillary reaching to below the middle of the eye. Teeth very small, in villiform bands on the right side of the mouth and in a single series on the left. Eyes small, shorter than the snout, two elevenths of the length of the head, lower slightly in advance of the upper. Operculum deeply notched on the hinder margin.

Scales minute, ctenoid.

Dorsal and anal fringed in the greater portion of the length; anal rays longer; dorsal origin above the forward portion of the eye; anal origin below the fifteenth ray of the dorsal; caudal pointed; ventral not covered by the gill membranes, of four rays.

Light brown, thickly freckled with brown and with whitish, in part forming transversely elongated spots. Dorsal and anal with small blotches of blackish, fading forward, black on the base of the caudal and at each side of it. On some individuals a series of small spots near the bases of dorsal and of anal are opposed to the spots on the fins. One specimen has a brown spot near the midlength reaching down toward the lateral line opposite another reaching upward from below.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 fathoms	57.1° F.	Rky.
3378	3° 58′ 20″ N.	81° 36′ W.	112 "	55.9° F.	Brk. Sh.
3379	3° 59′ 40″ N.	81 35 W.	52 "		Rks.

Symphurus atramentatus.

Symphurus atramentatus J. B., 1889, P. U. S. Mus., 177.

D. 94; A. 79; V. 4; Ll. 94–100; Ltr. 48.

Body sinistral, moderately elongate, depth five eighteenths and length of the head five twenty-fourths of the total length on specimens of a length of six and one half inches, or depth two sevenths and length of head three fourteenths of the total on specimens four and one quarter inches in length. Greatest depth near the nape, whence the taper to the caudal is somewhat regular. Snout short, about one and one half times as long as the eye, subtruncate, villous on the lower surface. Mouth small, nearly twice as long as the eye, asymmetrical, strongly curved. Teeth in villiform bands, more numerous and stronger on the right side. The tubular nostril of the left side is above the midlength of the mouth and close to the lip; that of the right side is farther forward and not so near to the mouth. Eyes small, very close together, without a bony interorbital ridge, about one sixth as long as the head, upper slightly in advance. The gill rakers in front of the first arch are reduced to three short tubercles on the lower section.

Dorsal and anal rather low, the greater number of the rays protruding as a fringe; dorsal origin above the middle of the eye; anal origin below the fourteenth ray of the dorsal. Ventral one third as long as the head, of four rays, below the opercle. Caudal pointed, with ten to twelve rays.

Scales small, ctenoid.

The right eye of one specimen has failed to come through the skin; it is to be seen in the tissues, with less than half the diameter of the left eye and with a minute pupil, directed toward the left, in the ordinary situation.

Specimens of the length of five inches are nearly uniform brown, faintly clouded with darker, and are marked with ten to a dozen, or more, blotches of black on dorsal and anal, which fins are whitish between and around the spots. Anteriorly the blotches are brownish and less distinct. Caudal tipped with white, blackish toward the base. Edges of scales darker. On young specimens the markings, both the black and the white, are more distinct, as also are the edgings of the scales; and there are five or six bands of brown, passing more or less directly across the left side, rather incomplete or broken anteriorly.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.
3378	3° 58′ 20″ N.	81° 36′ W.	112 "	55.9° F.	Brk. Sh.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fne. gy. S.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8° F.	Green mud.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8° F.	Green mud.

Symphurus microlepis sp. n.

Plate LII. fig. 3.

D. 101; A. 91; Ll. 135; Ltr. 58.

Outlines similar to those of *Symphurus atramentatus*, but curved rather more toward the tail; depth about one fourth and length of head two ninths of the total length. Snout short, little longer than the eye, rounded in front, villous on the right side. Mouth small, asymmetrical, strongly curved. Teeth small, in villiform bands, less numerous on the left side. Tubular nostril nearly midway from the eye to the end of the snout, near the mouth. Eyes small, prominent, close together, upper slightly advanced beyond the lower, length about one sixth of that of the head. Operculum with a shallow indentation on the hinder margin.

Scales very small, ctenoid.

Dorsal and anal fringed anteriorly; dorsal rays shorter toward the head; dorsal origin above the forward part of the eye; anal origin below the eleventh or the twelfth ray of the dorsal; ventral covered by the opercular membrane, as long as the snout inclusive of the orbit; caudal pointed.

Brownish, with seven transverse bands of brown, wider than the spaces by which they are separated, crossing the body and fins.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 30″ N.	79° 16′ W.	286 fathoms	45.9° F.	Green mud.

PHYSOSTOMI.

STERNOPTYCHOIDS.

In 1887, the date of the "Challenger" Report, the position of the Sternoptychidæ among the deep sea fishes was somewhat questionable. To-day it is yet undecided whether the fishes of this family are really taken at the great depths assigned to them. As they may enter the dredge anywhere on its way up or down, the actual depth of capture will have to be determined in the future by means of appliances opening and closing at particular intermediate depths between the bottom and the surface. The only present knowledge of conceded value relating to the habitat is based entirely on inferences. Firmness of structure is suggestive of a life near the surface and the large eyes and the luminous organs with that structure point toward a life in comparative darkness or to nocturnal habits, as was suggested by Günther. To its uttermost limits sunlight reaches down in the sea a hundred and eighty fathoms, more or less, and it may be questioned whether the upper life-area of the ocean extends much farther down. At the bottom there is another area of life and light, the phosphorescent, in vertical extent probably much less than that at the surface, possibly limited to less than thirty fathoms. Where the sea is less than two hundred fathoms or thereabout it is probably lighted and full of life, other conditions being favorable, from top to bottom, but where the depth is greater the two areas of light are separated by a dark area the depth of which varies according to the total ocean depth at the particular locality. Though the dark area may be traversed in any direction, and though no doubt near its limits it serves as a hiding or lurking place for the preyed upon and for the predacious, it is rather doubtful whether otherwise it is permanently inhabited. All things considered it appears likely that many of the Sternoptychidæ do not descend much beyond the reach of the sunlight, a conclusion independently reached from study of the colors, which latter are those of pelagic animals, or those of the surface, rather than those of great depths (see Plate J).

Close relationship is evident between the species of the central eastern Pacific and those of the central western Atlantic, but they can hardly be said to be closer than such as exists between the former and species of other localities in the northern or the western parts of the Pacific.

The eight species of the family represented in the present collection all appear to be more or less distinct from what have previously been described. Besides these, several others used in comparisons have also been described. The fact that the species in the collection differ so much from those heretofore known suggests that, though they might be expected to drift readily with the ocean currents, there is actually less of horizontal migration than was expected.

The resemblance between the very young Argyropelecus and the adult of Valenciennellus or Maurolicus indicates that the ancestral form of the first was approximately the present form of the last. The new genus Lychnopoles differs from Gonostoma mainly in possessing several additional rows of luminous organs on each flank. It might perhaps be better placed if the generic diagnosis of the latter were so modified as to admit it as a subgenus. Opisthoproctus has been placed in the family by others; it is left there until a better place is found for it.

STERNOPTYCHIDÆ.

Sternoptyx obscura sp. n.

Plate LIII. fig. 1.

Br. r. 5; D. 10; A. 13; V. 5; P. 10.

Body longer, less deep, and less oblique than that of *S. diaphana*, greatest depth about two thirds of the entire length without the caudal. Length of the head three fifths of its depth, four ninths of the depth of the body, or less than one third of the length from the snout to the base of the caudal, with a longitudinal groove on the forehead between two keels. Eye large, nearly half as long as the head. Mouth wide, nearly vertical; maxillary narrow, as long as the eye. Teeth very small, in narrow bands. Chin short, vertical. Tongue broad, slightly notched at its end. A short sharp spine below the angular; another below the preopercle; two above the occiput; and two more above the shoulders. A short strong spine below the front end of the humeral symphysis; below, the chin is formed of two parts of which the left (in this example) is the more forward; both parts hooking backward slightly. Opercular margins membranous. Gills four. Pseudobranchiæ present. Five ridges across the flank. The compressed blade-like spine at the origin of the dorsal is serrate, with about twenty-five teeth. The ventral spine has four cusps, the anterior pair longer and directed forward, the posterior pointing down. The anal spine is forked, and inclines forward and downward. The greatest convexity in the dorsal outline of the body lies under the dorsal fin. The angular diaphanous space forward of the anal is very little wider than a right angle.

The luminous facets, lanterns, on each side are distributed thus: three small ones at the lower edge of a wart-like prominence a little above the base of the pectoral; one behind the angle of the mouth, and apparently another a short distance above; four or five in each branchiostegal series; ten large ones in the close series from the humeral spine to the ventral; three in the abdominal series; three in the anal group; three or four in the subcaudal group; and three on the flank a short distance above the vent.

Upper portions clouded brown or blackish; flanks and lower surfaces silvery; lanterns silvery, edged with black. The luminous organs are in function downward; that is, forward when the creature is swimming and feeding. The lower (anterior) fourth of the iris is silvery, as also is a patch on the cheek below the eye. The silver area below the orbit contains indications of a lantern; possibly rudimentary, but useful in estimating the affinities of the genus.

This species is readily distinguished from *S. diaphana* by the difference in form.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
2619 (Hyd.)	7° 31′ N.	78° 42′ 30″ W.	1100 fathoms	36.5° F.	Gn. glob. Oz.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 “	40.1° F.	Sft. bl. M.
3357	6° 35′ N.	81° 44′ W.	782 “	38.5° F.	Gn. S.
3360	6° 17′ N.	82° 5′ W.	1672 “	36.4° F.	Fne. bk. dk. gn. S.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 “	54.8° F.	Rks. and S.
3374	2° 35′ N.	83° 53′ W.	1823 “	36.4° F.	Gn. Oz.
3375	2° 34′ N.	82° 29′ W.	1201 “	36.6° F.	Gy. glob. Oz.
3377	3° 56′ N.	81° 40′ 15″ W.	764 “	38° F.	M.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 “	35.8° F.	Gn. M.
3383	7° 21′ N.	79° 2′ W.	1832 “	36° F.	Gn. glob. Oz.
3388	7° 6′ N.	79° 48′ W.	1168 “	36.2° F.	Gn. glob. Oz.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 “	36.4° F.	Hard.
3398	1° 7′ N.	80° 21′ W.	1573 “	36° F.	Gn. Oz.
3399	1° 7′ N.	81° 4′ W.	1740 “	36° F.	Gn. Oz.
3400	0° 36′ S.	86° 46′ W.	1322 “	36° F.	Lt. gy. glob. Oz.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 “	42.3° F.	R. glob. Oz.

Argyropelecus lychnus sp. n.

Plate J, fig. 1, 1 b.

Br. r. 9; D. VII + 9; A. 7 + 5; V. 6; P. 11.

Very narrow and very deep in the body, half as deep and narrower in the caudal section. Body cavity more than half of the total length, as also is the greatest depth. In young stages the depth is much less as compared with the length. Length of the head about half of the depth of the body or one third of the length from the snout to the caudal notch; forehead very narrow, with two longitudinal keels separated by a narrow groove, narrower in the interorbital space. Eye large, less than half of the head. Snout short, two thirds as long as the eye, blunt; chin nearly vertical, with a small symphyseal protuberance. Mouth wide; maxillary twice as long as the eye, forming rather more than half of the upper border of the mouth. Teeth small, acicular, separated, in single series; there are eleven or twelve on the intermaxillary, of which the third or the fourth is the largest; there are sixteen, more or less, on the maxillary, half of them hooking backward and the posterior six or eight hooking forward; the dentary teeth are longer and erect, with the exception of a few of the anterior which are hooked, the fifth or the sixth being decidedly so; the few on the anterior portions of the palatines are minute. Gill rakers long, half the length of the eye, slender, eight (seven to nine) on the upper portion of the first arch and eight to ten, with two or more rudiments, on the lower. A small spine above each shoulder on the nape; a spine below the preopercle; another less prominent below the angular. Ventral spine in two sections, of which one turns forward, the other backward. Dorsal blade containing seven spines, upper edge not denticulate. Anal fin in two divisions, indicated by a larger interspace between the rays. Pyloric cæca six to seven or to five. The blade in front of the dorsal fin, and the abdominal keel are not serrate.

The lanterns, luminous organs, are distributed thus: one on the forehead; one in front of and one behind the eye; two backward of the end of the maxillary; two above and backward from the base of the pectoral, and six behind these, directly backward of the base of the fin; and six in the branchiostegal, six in the pectoral, twelve in the abdominal, four in the ventral, six in the anal, and four in the subcaudal section of the lower or ventral series. In these lanterns the disk is in the upper part while the elongate lower portion is silvered as if for purpose of reflection.

Sides silvery, with black edgings to the lanterns, snout white, tipped with black; fins whitish; back and base of caudal blackish; iris black. On displacement of the silvery epiderm black or brown substrata appear.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
2619 (Hyd.)	7° 31′ N.	78° 42′ 30″ W.	1100 fathoms	36.5° F.	Gn. glob. Oz.
3353	7° 6′ 15″ N.	80° 34′ W.	695 "	39° F.	Gn. M.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 "	40.1° F.	Sft. bl. M.
3360	6° 17′ N.	82° 5′ W.	1672 "	36.4° F.	Fne. bk. dk. gn. S.
3375	2° 34′ N.	82° 29′ W.	1201 "	36.6° F.	Gy. glob. Oz.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 "	35.8° F.	Gn. M.
3382	6° 21′ N.	80° 41′ W.	1793 "	35.8° F.	Gn. M.
3383	7° 21′ N.	79° 2′ W.	1832 "	36° F.	Gn. glob. Oz.
3384	7° 31′ 30″ N.	79° 14′ W.	458 "	42° F.	Gn. S.
3385	7° 32′ 36″ N.	79° 16′ W.	286 "	45° 9 F.	Gn. M.
3388	7° 6′ N.	79° 48′ W.	1168 "	36.2° F.	Gn. glob. Oz.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 "	36.4° F.	Hard.
3395	7° 30′ 36″ N.	78° 39′ W.	730 "	38.5° F.	Rky.
3406	0° 16′ S.	90° 21′ 30 W.	551 "	41.3° F.	R.
3410	0° 19′ N.	90° 34′ W.	331 "	44.2° F.	Bk. S.
3414	10° 14′ N.	96° 28′ W.	2232 "	35.8° F.	Gn. M.

Argyropelecus caninus sp. n.

D. VII. + 10; A. 8 + 6; V. 7; P. 10.

The form and proportions are somewhat like those of *A. lychnus*, Plate J, fig. 1; the depth of the body is more than two thirds of the total length, and the length of the body cavity is more than half the length from the snout to the end of the caudal; the depth of the caudal section at the origin of the anal fin is more than half the depth of the body. Head much compressed, like the body in this respect, one fourth of the total length. Snout short, with a sharp point on the mandibular symphysis. Mouth large; maxillary nearly as long as the head. Teeth acicular, hooked, unequal, in single series; the fifth or the sixth on the lower jaw much the largest; six or eight of the hindmost on the maxillary hooking forward, all the others hooking backward. The blade in front of the dorsal is serrated on its upper edge; the abdominal keel also has serrations on its edge. The position of the lanterns is about as in *A. lychnus:* there are six branchiostegal, six pectoral, eleven abdominal, four ventral, six anal, and four subcaudal, besides one in front of the eye, another behind the orbit, two behind the maxillary, and one on the middle of the forehead. The ridges on the nape have serrated edges. There is a small spine above each shoulder on the nape, one below each angular, and a larger one below each preopercle. The spine below the humeral symphysis is forked, while that in front of the ventrals is simple, though possibly abnormal on this specimen.

A narrow streak along the back and the edgings of the lanterns are deep black; the flanks and the faces of the lanterns are silvery.

The peculiar serration of dorsal and abdominal crests and the fin formulæ serve to distinguish this species from *A. lychnus*. The specimen described was "Found floating on a log in the Indian Ocean off Port Louis Harbor."

Wood-Mason and Alcock, 1891, Annals and Magazine of Natural History, VIII., p. 126, mention an "Argyropelecus, sp. prox. *hemigymnus*, Cocco," saying of it "A small specimen was taken at Station 118, in 1803 fathoms; it agrees very closely with *Argyropelecus hemigymnus* Cocco from which it differs most conspicuously in having the luminous spots in a continuous unbroken series from the head almost to the base of the caudal; the tail also is not so abruptly constricted off from the abdomen." "This, so far as I know, is the first record of *Argyropelecus* from the Indo-Pacific."

In his latest list Alcock, 1896, refers the specimen to *A. hemigymnus* without comment. The description quoted does not apply to the young of the Mediterranean species; the author must have had something in hand that is not yet named. Neither *A. hemigymnus*, *A. lychnus*, nor *A. caninus* have the luminous spots in a continuous unbroken series from the head almost to the base of the caudal, and the smaller the specimens of either the greater the comparative lengths of the spaces separating the groups of the lanterns. Evidently the species indicated from the Indo-Pacific is more closely allied to that from the Atlantic to which the name *A. affinis* is here applied, identified by Goode and Bean with *A. hemigymnus*, the most remote of the present contents of the genus, and probably worthy of subgeneric distinction.

A. caninus is closely allied to *A. aculeatus* C. V. from the Azores, but has not the slender tail. Sauvage, 1891, in his Fishes of Madagascar, figures a specimen, Plate XLVIII., fig. 5, from Isle Réunion under the name *A. aculeatus*, which differs somewhat in shape from *A. caninus* and has sixteen rays in the anal fin.

Argyropelecus affinis sp. n.

Argyropelecus hemigymnus G. B., 1896, Oc. Ich., Pl. XXXIX., fig. 147.

D. VII + 9; A. 13.

In this species the head is longer, the body is less deep, the clavicular symphysis is less prominent, the caudal section is of greater comparative depth, and the lanterns between the operculum and the caudal are more nearly in a continuous series than in *A. hemigymnus*. The depth of the body is about two fifths of the length from the snout to the end of the caudal, and the greatest depth of the caudal region is nearly two thirds of that of the body. Head length about one third of the distance from the snout to the base of the caudal. Spines below the preopercles, the mandibles, at the upper ends of the scapulars, and the spine below the ends of the claviculars small. The dorsal blade resembles that of the other species of the genus; it includes a similar number of spines with slightly protruding ends, but has not the serrations between them as in *A. caninus*. The lanterns appear to be about the same in number as on *A. hemigymnus* but differ in arrangement; instead of the three very distinct and widely separated groups between the ventrals and the caudal (the ventral, the anal, and the subcaudal group), there is a nearly continuous series.

Station.	Latitude.	Longitude.	Depth.
2117	15° 24′ 40″ N.	63° 31′ 30″	683 fathoms

The outlines of this species make a considerable approach from those of *A. lychnus* toward those of the genus *Polyipnus*, which, though unrepresented in the collection immediately concerned in this report, has particular interest here in connection with the faunal affinities, and from the fact that besides the species hitherto recorded from the Indo-Pacific the genus is also represented by an undescribed one from the Atlantic. With the description of the latter a number of items are added to the diagnosis of the genus.

POLYIPNUS.

Polyipnus Günt., 1887, "Challenger" Report, Deep Sea Fishes, 170.

Form intermediate between that of *Argyropelecus* and that of *Ichthyococcus*, much compressed, tapering in the caudal region; body covered by large very thin scales. Eyes large, lateral. Mouth of medium width; maxillary wide, nearly vertical. Teeth small, acicular, on jaws, palatines, and vomer. Forehead with a ridge at each side. Preopercular and scapular spines. A small compressed blade in front of the dorsal fin. An abdominal keel composed of the united lower edges of imbricated plates each of which covers a lantern. Four gills, fourth small; rakers long, numerous. Pseudobranchiæ.

Two species known; *P. spinosus* Günt. secured by the "Challenger" between the Philippines and Borneo, in 250 fathoms, and *P. laternatus* n. sp., taken by the "Blake" off Barbados, in 221 fathoms.

Polyipnus laternatus sp. n.

Polyipnus spinosus G. B., 1896, Oc. Ich., Pl. XXXIX., fig. 148.

Br. r. 9; D. 14; A. 9 + 7; V. 7; P. 15; Ll. 31.

Between *P. laternatus* and *P. spinosus* there is not a great deal of difference in shape. The outline of the lower surface is but little indented between the ventrals and the anal. The length of the head is nearly one third of the total length, or a little more than half of the greatest depth; the crown has a low sharp ridge at each side. Snout short, blunt. Mouth of moderate size, nearly vertical, more than half of its upper border formed by the intermaxillaries. Teeth minute, in single series on the jaws, on the anterior ends of the palatines, and at each side of the vomer; the last series curving forward toward the palatine. Gill rakers slender, more than half as long as the eye, eight plus fourteen on the forward edge of the first arch. Pseudobranchiæ well developed. Abdominal keel of ten pairs of plates. Clavicular and ventral angles short. Scapular spines more than one third as long as the eye, directed backward. The blade in front of the dorsal is a small, low, compressed ridge which precedes two ridges, with a trough between them, that end in a pair of backward upward and laterally directed spines immediately in front of the fin. The blade forms a sharp angle in front of the trough. Pectoral fins elongate, reaching behind the bases of the ventrals. Caudal deep; caudal pedicel deep and strong; caudal section not abruptly constricted at the body.

The lanterns are well developed in both disks and reflectors; they are placed as follows: one on the forehead, one in front of and one behind the eye, two behind the end of the maxillary — the larger below the orbit, six in the branchiostegal series, six on the isthmus, ten along the edge of the abdomen, four in the ventral series, eleven in the row at the side of the anal, four in the subcaudal group, three above the base of the pectoral — the anterior nearest the fin, the second close by and the uppermost higher on the side behind the middle of the operculum, one near the middle of the flank, three above and near the hinder ones of the abdominal series, one above and near the foremost of the ventral series, and three above the space between the ventral and the anal series.

Flanks and sides of head silvery; snout white, freckled with black; a transverse blotch of white behind the interorbital space; dorsum black, the pigment descending farther upon the side below the dorsal blade; lanterns edged with black; sides of body and base of the caudal with irregular specks of black; lower fourth of iris silvery, remainder black.

The specimen described was secured by the U. S. steamer "Blake," dredge number 280, off Barbados in 221 fathoms. Through some error it was returned with the identification *Argyropelecus Olfersii.* The specimens identified as *Argyropelecus hemigymnus* do not belong to that species, so that its occurrence in the western Atlantic is still doubtful. One of the "Blake" individuals, marked as having been figured, apparently is the original of number 148a of Plate XXXIX. in the Oceanic Ichthyology.

Valenciennellus stellatus sp. n.

Plate LIII. fig. 2.

Br. r. 9; D. 12; A. 23; V. 8 (9); P. 12.

In a general way the outlines given by Lütken, 1892, in his work on the Scopelini for *Maurolicus tripunctulatus* Esm., Plate I. fig. 6, resemble those of the present species; the latter differs in possessing a shorter dorsal that ends much farther forward, and in having only four groups of the small circular light facets below the caudal section, while Esmark's species has a long dorsal and five of the subcaudal groups. A further peculiarity of the species *V. stellatus* consists in a lateral silvery area on each of the black organs or blotches in the lower edges of which, surrounded by the black and facing downward, the very small, round facets of the groups are situated. Seen from the side the facets of the groups are hardly visible, but viewed from below it is the lateral silvered area that is unnoticeable while the short group or series below it is very distinct.

Moderately elongate, much compressed, in greatest depth of body or in length of head nearly equalling one fourth of the total length; body cavity hardly half the length from the snout to the base of the caudal. Head short, as deep as long, narrow, one third as wide as deep. Snout shorter than the eye; tip forward of the middle of the eye and formed by the prominent symphyseal angle of the lower jaws. Chin forming a broad and almost regular curve forward and upward from the throat to the end of the snout. Mouth wide, oblique; a short portion of its border formed by the intermaxillaries; maxillaries broadly expanded and curved so as to pass outside of and to cover the greater portions of the lower jaws, furnished with teeth along the entire lower edges, reaching as far backward as the hinder border of the orbit, rounded on the posterior extremity. Teeth very small, acuminate, irregular. Nostrils minute, close together, near the orbit.

Dorsal origin very little forward of the middle of the distance from the snout to the caudal base. Anal origin opposite that of the dorsal; base extending within less than one ocular diameter of the caudal. Ventrals minute, near the vent, reaching the anal. Pectorals low on the sides, long, reaching the ventrals. Caudal moderately strong, notched.

The light organs vary in size from comparatively large to very small; they are distributed on each side about as follows: a series of six at the bases of the branchiostegal rays; a group of three on the isthmus, and between this and the shoulder a second group of four, each group in a large black mass with silvery lateral face; a series from the isthmus to the vent of seventeen, followed between the ventrals and the anal by a group of four; a group of three minute facets above the ninth, another group of four above the fifteenth, and a third group of three above the nineteenth anal ray; a group of several below the base of the tail; and a series of five larger ones from the shoulder backward. These luminous organs are larger below the belly and in the head; the circular facets are commonly directed down, and the side of the blotch in which they are seated most often bears a larger area of silvery. A large round spot of black, without silver, lies directly in front of the eye below the nostrils; and a row of seventeen dendritiform spots of black extends from the upper angle of the operculum to the tail along the lateral line, hindmost larger.

Muscular areas light rusty brownish; snout and fins whitish, back and lower portions of head and abdomen blackish.

Number	Latitude.	Longitude.	Depth.
163	30° 31′ 35″ N.	140° 5′ 30″ W.	300 fathoms.

Maurolicus oculatus sp. n.

Plate LIII. fig. 3.

Br. r. 9; D. 6; A. 24; V. 6; P. 17.

In some degree the outlines of this species resemble those of *V. stellatus;* distinguishing features are patent in the prominence and greater convexity of the chest below the mouth, in the shorter body cavity, in the longer caudal section, in the anterior position and the shortness of the dorsal fin, in the dentition, and in the arrangement of the light organs.

Form elongate, compressed, greatest depth near the head about one fifth of the total length, body tapering gradually from the pectorals to the caudal fin, body cavity in the anterior third of the total. Head compressed, width nearly half of either length or depth, descending slightly on the top from the nape to the snout, strongly curved forward and upward from the pectorals in the lower outline. Snout as long as the eye, vertically subtruncate as seen from the side, ending in a point less than a right angle as viewed from above, tip formed by the symphyseal angle of the very prominent lower jaws. Chin very steep, bearing a glandular mass (possibly luminous) in front immediately below the symphysis. Mouth oblique, cleft hardly extending below the eye, corner of the angular lying below the anterior fourth of the orbit; intermaxillaries short; maxillaries of medium length, much expanded, reaching down along the sides of the dentaries in a broad curve below the greater portion of the orbit, not extending as far as the back of the eye. Teeth very small, close together and nearly regular in size in the mouth, but a great deal larger and irregular in sizes and spaces on the lower edge of the expanded portion of the maxillary at the sides of the head. Eye large, nearly two fifths of the length of the head; interorbital space very narrow. Nostrils small, close together, nearer to the orbit than to the mouth. Opercles thin, broad, reaching backward of the bases of the pectorals.

Dorsal fin short, base entirely forward of the anal, origin at the end of the anterior third of the entire length. Anal long, origin little backward of the base of the dorsal, end of base one ocular diameter from the long rays of the caudal. Ventrals small, reaching the anal. Pectorals long, reaching beyond the bases of the ventrals, rather low on the sides of the body. Caudal comparatively large, notched; pedicel moderately strong.

On the body the structure of the light organs differs to some extent from that obtaining on the caudal region. On the latter, single ones, those not in groups, may be described as vertically oblong black areas in the middle of each of which a circular yellow pupil is situated; the groups are similar, but the black spot is larger and includes a row of several pupils. On the body the organs have the appearance of vertically subelliptical or oblong whitish or bluish translucent areas, the upper end of each of which contains the yellow organ. The structure approaches that of the same organs on Argyropelecus and Polyipnus. The number of the organs is one hundred and twenty-two (one hundred and twenty-four if the nasal spots are included); they are arranged as follows: six in each branchiostegal series, three plus four on each side of the isthmus to the shoulder, seven behind the shoulder to a point above the vent, eleven between the isthmus and the vent, a group of five on each side above the vent, and on each side of the caudal region a group of three above the anterior rays of the anal followed by a row of sixteen, one to each muscle band, the hindmost lying at the end of the base of the anal, followed at the short rays of the caudal by a group of four which in turn is followed by a single one. The round spot of black below the nostrils in front of the eye lacks the yellow centrum.

Snout whitish, belly and remainder of the head blackish, muscular portions flesh color (from dermal abrasion), fins light yellowish.

Number.	Latitude.	Longitude.	Depth.
540	35° 19′ 30″ N.	125° 21′ 30″ W.	300 fathoms to the surface.

Maurolicus lucetius sp. n.

Plate J, fig. 2.

Br. r. 9; D. 14; A. 15; V. 7; P. 9.

The form of this species is about as much elongate and compressed as that of *M. attenuatus.* The depth is one sixth and the width one ninth of the total length. Head compressed, length one and three fourths times its depth, or nearly one fourth of the total length, slightly concave between the eyes, vertical on the cheeks; chin rising forward. Snout pointed, as long as the eye, end formed by the lower jaws, which are longer than the upper and in which the symphyseal angle is prominent. Eye large, two sevenths of the length of the head, twice as wide as the interorbital space. Mouth wide; maxillaries tooth bearing, broad, making a wide and regular curve down and backward in the hinder four fifths of their length; outside of the middle portions of the lower jaws, extending backward of the orbit one third of the length of the eye. Teeth small, unequal, a series along the entire lower edge of the maxillary, a short series of four or more on each palatine. Nostrils small, nearer to the eye than to the end of the snout. Opercles broad, extended backward above the bases of the pectorals. Gill openings very wide; membranes not united, free from the isthmus.

Dorsal origin midway from the snout to the base of the caudal. Anal origin below the eighth ray of the dorsal. Adipose fin above the hinder end of the base of the anal. Ventrals about midway from the nostrils to the base of the tail. Caudal long, nearly as long as the head, deeply forked.

The light organs are directed downward; in appearance they are globular bodies the lower side of each of which is a round silvery facet and the balance black. The total number of light organs on the two sides of the head and the body is one hundred and sixty. Two of these organs occur on each side of the head at the upper edge of the maxillary, one below the space between the nostrils and the eye, the other below the back portion of the orbit; two more appear at the lower edges of the opercles, in continuation of the humeral series on the body; eight are situated at the bases of the branchiostegal rays; eight are found on each side of the isthmus; each humeral series, from above the pectoral to a point above the first ray of the anal, contains eleven forward of the ventrals and as many more backward of them; in each ventral series there are fourteen from the isthmus to the ventrals, ten from the ventrals to the anal, and fourteen at the side of the anal to the base of the caudal. As in Chauliodus and Gonostoma the humeral series ends at the anal fin.

Two inches in the entire length.

Back blackish; top of the snout and fins lighter, the latter puncticulate; flanks and sides of the head silvery; belly silvery between the light facets; a transverse streak of puncticulations on the bases of the caudal rays.

A smaller specimen has a black spot on each side of the chin near the angle of the mouth, and very little of the darker puncticulations on back or base of tail. A third individual possesses a small black spot on the preopercle directly back of the middle of the eye.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3428	21° 36′ 30″ N.	106° 25′ W.	238 fathoms	48.1° F.	Dk. gy. S. glob.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 "	57.1° F.	Rky.
2627 (Hyd.)	0° 36′ N.	82° 45′ W.	1832 "	36° F.	Gy. glob. Oz.

LYCHNOPOLES gen. n.

Elongate and slender in form, with body and head much compressed, and with the body cavity occupying half or more of the entire length. Body covered by large thin scales; head naked. Mouth wide, oblique; intermaxillary forming half or more of the dentigerous portion of the upper jaws. Teeth small, unequal, acicular, in a single series on each jaw, a row of six or eight on each palatine, in a villiform patch of very small ones on the vomer at each side of which there is a small conical tooth. Eyes large, lateral. Gill openings very wide, extending forward to below the nostrils; gill rakers numerous, of moderate length, slender. No pseudobranchiæ. Branchiostegal rays fourteen. No barbel. No air bladder. Stomach long, cæcal. Dorsal short, origin near the middle of the total length, slightly forward of that of the anal. Anal long. Caudal forked. Ventrals abdominal. A spine-like prominence below the scapulary symphysis. A large luminous disk between each eye and the intermaxillary, two smaller ones behind the end of the maxillary — one behind the other, one below each side of the chin, a series of eleven on each branchiostegal membrane — between the basal portions of the rays, a series of nine at each side of the isthmus, and four series of about forty-four glands each on each side of the lower portion of the body.

Distinguished from Gonostoma to which this genus is closely allied by a larger intermaxillary, by the small teeth, by a greater number of series of luminous glands, and by the positions of dorsal and ventrals.

Lychnopoles argenteolus sp. n.

Plate LIII. fig. 4, 4 a.

Br. r. 14; D. 14–16; A. 26–29; V. 7; P. 9; Ll. 45 ca.; Ltr. 8; Vert. 20 + 25.

Moderately elongate, slender, much compressed, depth one seventh and length of body cavity one half of the total length. Head narrow, nearly one fifth of the entire length, forehead flattened, cheeks vertical, chin prominent and pointed. Snout medium, one and one half times as long as the eye, sharp at the symphysis of the lower jaws. Eye rather large, one fifth as long as the head, two thirds of the length of the snout, four fifths as wide as the interorbital space. Mouth large, oblique, about three fourths as long as the head, midlength below the eye; maxillary short, curved on the lower edge, rounded at the end, extending one diameter of the eye backward of the latter; intermaxillaries forming more than half the length of the upper jaws. Teeth small, unequal, slender, sharp, hooked, in two series, alternating, on intermaxillaries and dentaries, in a single series on maxillaries and palatines. Six teeth on each palatine. None of the teeth are large enough to be called fangs; the inner are opposed to the spaces between the outer on each jaw; the maxillary teeth are somewhat inclined forward. Gills four; no pseudobranchiæ; gill rakers slender, as long as the eye; six plus fourteen on the outer edge of the first arch. Opercles very thin. Scales large, broad, thin, deciduous; cheek scales moderately large, very thin, the large one on the maxillary as long as the eye and half as wide. Vent midway from the snout to the end of the caudal, below the fourth ray of the dorsal fin. Seven pyloric cæca. A short, sharp, spine-like angle below the isthmus.

Dorsal origin midway from the eye to the base of the caudal; base of dorsal ending above the eleventh ray of the anal. Anal origin below the sixth ray of the dorsal; anal base twice the length of that of the dorsal. Ventrals small, half way from the pectorals to the vent. Pectorals small, low upon the sides. No adipose fin apparent. Caudal forked.

The luminous facets are mostly in function downward. With one exception, perhaps, each facet is composed of a black substructure on which rests a yellow disk, usually at the upper edge in the organs of the sides, having toward the lower edge a bluish or silvery area similar in a measure to that in the facets of Argyropelecus. In the ventral series of facets on each side of the body there is a single one below the snout, followed by nine below the hyoid and these by fifteen from the pectorals to the ventrals, plus nine from the ventrals to the vent, plus twenty-two from the vent to the caudal. In the next series above the ventral there are two facets on the operculum plus eleven from the shoulder to the ventrals, plus ten from the ventrals to the vent, plus twenty-two from the ventrals to the caudal. On the flank above the lower two rows there is a third series of smaller facets and above this a fourth of hardly more than dots. The large facet between the eye and the intermaxillary is peculiar in that it is hard and black at the surface while the yellow matter usually forming the disk lies under or behind it as if the facet was in function inward or backward.

The twelve (in cases eleven) branchiostegal light facets occupy the intervals between the rays.

Black, lighter on fins and snout, silvery on cheeks, eyes, and flanks. The silvery area of the head passes through the eye across the cheek to the suboperculum. Below the scales the skin appears more or less of silver color. Linings of mouth, gill chamber, and belly black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. M.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 "	48° F.	Fne. gy. S.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8° F.	Gn. M.

Cyclothone signata sp. n.

Plate J, fig. 3.

Br. r. 13 ; D. 12 ; A. 21 ; V. 7 ; P. 10.

Apparently this species is less slender than *Cyclothone acclinidens.* The positions of the fins, and the formulæ, do not vary greatly from those of that species, but the coloration is very different; it is in this that the greatest distinction occurs. The colors of each of these species were taken from fresh specimens, and the figures, Plate J, figs. 3 and 4, show them as they existed at the time. In the present types the ground color was white ; on this the eyes and light organs appeared black with silver facings, the belly was blackish, from the black abdominal linings, tinted with bluish, and near the edges with reddish, and there were blackish markings in various parts of the surface: a pair of elongate spots on the forehead, diverging from the nape toward the eyes, a series of transverse streaks on the flank, as if to outline the vertebræ, a broken line along the flank, a series of spots along the bases of the rays on dorsal and anal, a group of several spots behind the angle of the mouth, a group behind the abdominal cavity on the flank, several spots on the base of the tail, and a transverse streak across the bases of the caudal rays.

The light facets are comparatively large ; below the eye one is present ; there are eleven in the branchiostegal series, four or five on the isthmus, fifteen or sixteen between the isthmus and the anal, and fourteen or fifteen from the anal to the caudal.

On these specimens the teeth may be pressed forward against the jaw to spring out again on removal of the pressure, but whether the animal can place its teeth close along the jaws and extend them out at will in life is another question, yet one to which differences in the positions of the teeth in various individuals suggest an affirmative answer. On the specimens of *C. acclinidens* no such motion is observable; pressed in one direction or the other they break before moving. The maxillary teeth of *C. signata* are shorter, more numerous and more erect than those of *C. acclinidens.*

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Gn. M.

Cyclothone acclinidens sp. n.

Plate J, fig. 4.

Br. r. 14 ; D. 14 ; A. 18–20 ; V. 7 ; P. 10.

Although this form is very much like *Cyclothone microdon* it is readily distinguished by differences of dentition. Body slender, compressed, moderately long. Head narrow, about one fifth of the total length, pointed at the snout. Eye small, nearly half as long as the snout, one eighth of the length of the head. Snout short, narrow, sharp at the tip. Mouth large, more than four times as long as the snout; intermaxillaries short, hardly one fifth as long as the maxillaries ; maxillaries forming a broad curve down and backward, thin, rather narrow, furnished with teeth along the entire lower edge ; lower jaws much stronger backward, uniting in a sharp point at the symphysis. A low prominence or angle above the upper jaws, at each side of the top of the snout. All of the teeth are slender acicular, very sharp, more or less bent and have striæ passing obliquely toward the point and to the concave side of the teeth; intermaxillary teeth six to eight, smaller, less slender; maxillary teeth about fifty-two, very small forward, nearly vertical in the anterior third of the length, gradually becoming much larger backward, more or less closely inclined forward toward the jaw, slightly bent outward near the points. Though the inclined teeth only number about half as many as the vertical they occupy about two thirds of the length of the jaw. One or two of the hindmost teeth are smaller and nearly vertical. Vomerine teeth about four in a short series at each side slightly convergent forward. Palatine teeth in a group near the front ends of the bones. Branchiostegal rays fourteen to thirteen. On each side there are thirteen luminous organs in the branchiostegal series, sixteen between the isthmus and the anal, and sixteen between the origin of the anal and the bases of the longest caudal rays. Scales thin deciduous; cheeks naked.

Origins of dorsal and anal opposed, little behind the middle of the entire length. Pectorals narrow, long, reaching behind the bases of the ventrals. Ventrals small, nearer to the anal than to the pectorals. Caudal notched.

Blackish to brown, with puncticulations and dots of black on body and fins; belly black. A round black spot above the maxillary below the forward part of the eye.

The original description of *C. microdon* of Günther, 1878, Ann. Mag. Nat. Hist., p. 187, is as follows: "D. 13; A. 18–21. Cheek naked. Teeth in the upper jaw very fine and numerous, with some larger ones placed at regular intervals. Eyes small." "Atlantic and Pacific, 500–2900 fathoms." Goode and Bean, 1896, Oc. Ich., p. 100, add to this in the description of *Cyclothone lusca,* identified by Günther with *C. microdon* Günt., branchiostegal rays 7–9, ventral rays 5, and vomerine teeth "sometimes in patches, sometimes reduced to a single pair of fangs." The type indicates that some error has crept into this, as there are thirteen branchiostegal and seven ventral rays and the vomerines have a short series of four teeth on each side. The specimen has twelve luminous organs in each branchiostegal series, and there are seventy-eight maxillary teeth, of which about half incline forward, but not so much as on *C. acclinidens,* and eighty teeth on the lower jaw of which about fifty are more or less inclined forward. On specimens of the same size the maxillary teeth of *C. acclinidens* are fewer in number, larger in size, and more crooked than those of *C. microdon.*

Number.	Latitude.	Longitude.	Depth.
109	36° 47 10″ N.	122° 3′ 20″ W.	122 fathoms.
138	32° 17′ N.	135° 49′ W.	2413 "
152	31° 14′ 30″ N.	138° 19′ W.	300 "
540	35° 19′ 30″ N.	125° 21′ 30″ W.	300 fathoms to surface.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
2619 (Hyd.)	7° 31′ N.	78° 42′ 30″ W.	1100 fathoms	36.5° F.	Gn. glob. Oz.
2627 "	0° 36′ N.	82° 45′ W.	1832 "	36° F.	Gn. glob. Oz.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Gn. S.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 "	36.8° F.	Gn. M. S. rky.
3363	5° 43′ N.	85° 50′ W.	978 "	37.5° F.	Wh. glob. Oz.
3364	5° 30′ N.	86° 8′ 30″ W.	902 "	38° F.	Yl. glob. Oz.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 "	54.8° F.	Rks. and S.
3375	2° 34′ N.	82° 29′ W.	1201 "	36.6° F.	Gy. glob. Oz.
3377	3° 56′ N.	81° 40′ 15″ W.	764 "	38° F.	M.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 "	35.8° F.	Gn. M.
3382	6° 21′ N.	80° 41′ W.	1793 "	35.8° F.	Gn. M.
3383	7° 21′ N.	79° 2′ W.	1832 "	36° F.	Gn. glob. Oz.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3388	7° 6′ N.	79° 48′ W.	1168 fathoms	36.2° F.	Gn. glob. Oz.
3399	1° 7′ N.	81° 4′ W.	1740 "	36° F.	Gn. Oz.
3406	0° 16′ S.	90° 21′ 30″ W.	551 "	41.3° F.	R.
3411	0° 54′ N.	91° 9′ W.	1189 "	36.2° F.	Yl. glob. Oz.
3413	2° 34′ N.	92° 6′ W.	1360 "	36° F.	Glob. Oz. dk. Sp.
3414	10° 14′ N.	96° 28′ W.	2232 "	35.8° F	Gn. M.
3418	16° 33′ N.	99° 52′ 30″ W.	660 "	39° F.	Br. S. bk. Sp.
3435	26° 48′ N.	110° 45′ 20″ W.	859 "	37.3° F.	Br. M. bk. Sp.
3436	27° 34′ N.	110° 53′ 40″ W.	905 "	37.2° F.	Br. M. bk. Sp.

MYCTOPHOIDS.

This group contains so many diverse forms that it has been split up into half a dozen families or more. Synodus, Chlorophthalmus, Benthosaurus, Bathypteroïs, Ipnops, and Myctophum, each serves as the type of a family; and one or two of the other genera will no doubt on further acquaintance be similarly utilized. As there is no apparent advantage for the present report in the subdivision the group is here retained as a whole, though given less extent than by some of the more conservative authors. The Myctophoids possess a very general marine distribution. Wherever deep sea collections have been made individuals of various species have proved to be more or less abundant. Some forms are found near the surface, probably nocturnal, others are certainly inhabitants of regions near the bottom. Synodus, and species of Myctophum and of Chlorophthalmus are fair instances from the upper levels of the ocean, and the bathybial types are instanced by other species of Myctophum and of Chlorophthalmus, and by the genera Bathysaurus, Bathypterois, Scopelengys, and Ipnops. Bathysaurus is credited with a vertical range of 1738 fathoms, going down from a depth of 647 fathoms to one of 2385; the records for Chlorophthalmus give a range of 1340 fathoms, between a depth of 85 and one of 1425 fathoms; from the few captures made of Scopelengys its vertical range is 1137 fathoms, from 695 to 1832 fathoms; Ipnops has been taken at 1360 fathoms and at 1900, giving a range of 540; and Myctophum from the records would appear to occur at all depths from the surface to 2620 fathoms.

A considerable adaptive differentiation for life in the darkness obtains among these fishes. Probably all of the known forms are more or less luminous. The possession of lanterns, luminous glands or eye-like spots, by many of the species suggests a natural subdivision of the group into

Synodontoids from which the lanterns are absent, and *Myctophoids* on which they are present. Besides these glands there are luminous organs on the top of the head, on the snout, and on the upper and sometimes the lower edges of the caudal pedicel, in many cases. On some the fins are luminous, especially the adipose dorsal, and the scales reflect the light like mirrors. There are also extraordinary developments of the eye, making it at once an organ of sight, a luminous organ, and a reflector. The greatly modified eyes of Ipnops were shown by Mosely to have the structures of visual organs, yet it is probably the case that the broad ocular areas have the additional functions of phosphorescent organs, of reflectors, and of flash lights. In the iris of various species it is possible the different metallic tints and great brilliancy afford a means of recognition of their fellows by the members of the schools, and the luminosity of the eye itself is much increased in such forms as those ranged in Chlorophthalmus.

For tactile purposes there are excessive developments of the fin rays, and there are also sensory papillæ, as in Bathypteroïs, similar to those on the blind fishes of the caves, Amblyopsis and Typhlichthys. The lateral canal system retains the characteristics and probably the function of that system in the shoal water forms more nearly than in some of the other groups.

By the present collection there is added to the known species a new species of Chlorophthalmus a new species of Scopelengys, a genus hitherto known only from the Laccadive Sea where a species was secured by the steamer "Investigator," two new species of Bathypteroïs, allied to *B. longipes* and to *B. quadrifilis* taken by the "Challenger" off the eastern coasts of South America, a new and very distinct species of Ipnops, and six or seven species belonging to various of the subgenera of Myctophum and all more or less closely allied to species of that genus from the Atlantic.

The list of the species with ascertained depths is a long one, yet it will undoubtedly be much augmented in the future from other species now known for which no definite depths can be given at present.

SYNODONTIDÆ.

Synodus simulans sp. n.

Plate L', fig. 3.

D. 12; A. 9; V. 8; P. 12; scales 4–62–6.

These notes are taken from young individuals. The species is not an inhabitant of the deep sea, but is here used in comparison with other pelagic fishes and with those of great depths.

Form elongate, little compressed, somewhat pointed and rounded in front. Head moderate, larger comparatively and less pointed than in the species next described, about one fifth of the total length; crown with a slight convexity; a narrow groove on the interorbital space. Snout short, hardly as long as the eye, which latter is equal to the width of the interorbital space. Mouth wide; intermaxillary extending backward to a vertical from the hind border of the eye; lower jaw reaching one half the length of the orbit farther back than the intermaxillary. Teeth very small, in narrow bands on jaws, palatines, and tongue. Eye large, two ninths as long as the head.

Dorsal origin on a vertical from the hind ends of the bases of the ventrals, one half the length of the orbit forward of midway from the snout to the origin of the adipose fin, which last is above the seventh ray of the anal, that is close to the forward end of the posterior third of the length from the upper angle of the gill opening to the end of the tail. Anal smaller than dorsal, origin near the end of the foremost two thirds of the total length, or about halfway from the origin of the dorsal to the end of the caudal. Ventrals large, nearly twice as large as the pectorals.

Yellowish white, with a slight brownish cast on the back, with pairs of narrow streaks of brown across the back, about seven pairs between dorsal origin and caudal, with a streak of brown across the bases of the caudal rays, and with a series of eleven horizontally oblong spots of brown a short distance below the lateral line from the lower front portion of the base of the pectoral to within two or three scales of the first ray of the anal fin. Each spot of this series is larger than the pupil of the eye and in its posterior half contains a round spot of black nearly half as large. Fins light, caudal very little darker backward. Total length of largest specimen two and one eighth inches.

Taken in townets at the surface off the Cocos Islands.

In the arrangement and position of the lateral series of spots there is some resemblance to what obtains in respect to the lanterns on certain scopeloids, but the spot in *S. simulans* is merely a spot and has not the structure of the lanterns. Though not properly to be classed with the lanterns it is quite possible that the spots may serve as lures to bring a lantern-bearing prey within reach, and it may be they give a hint as to the manner in which the lantern of the scopeloid has originated. These spots differ from the other groups of pigment on the body in that they are more fugitive in alcohol and are deeper in the tissues.

Synodus acutus sp. n.

Br. r. 17; D. 11; A. 11; V. 8; P. 12; Scales 5–55–6; Vert. 52; Cæc. pyl. 18–19.

Subfusiform, acute anteriorly, slightly compressed and tapering gradually from the shoulders backward. Head small, narrowing forward; crown depressed, slightly concave, with a shallow groove on the interorbital space —narrower toward the snout; length four seventeenths of the total, width or depth half the length. Snout as long as the orbit, wider than long, pointed, slightly turned upward at the end. Mouth large; intermaxillary reaching half the orbital length backward of the eye. Teeth small, slender, unequal, depressible, larger on the lower jaws, shaped somewhat like an arrow-head at the cusp, in narrow bands on jaws, palatines and at each side of the middle of the tongue. Anterior processes of the lower jaws prominent, forming the end of the snout. Eye large, one fourth as long as the head, orbit cutting the profile of the crown. Cheek with four rows of large scales.

Dorsal origin midway from snout to adipose fin, very near the end of the anterior third of the total length; extreme length of the depressed fin equalling that of the ventrals; third ray as long as the head behind the eye. Pectorals shorter than the ventrals, three fifths as long as the head. Origin of the adipose fin above the sixth ray of the anal. Caudal deeply forked.

Scales of the lateral line with a ridge, other scales faintly ridged to merely convex.

Back light grayish to grayish olive; flanks, below the lateral line, and sides of head yellowish to silvery; belly silvery; a row of about ten brown blotches on the lateral line and about half the width of a scale lower a second series of twice as many smaller and fainter ones. There are faint indications of transverse bands on the back, connecting with the larger blotches on younger individuals. Dorsal and caudal darker backward; adipose fin with light edges; ventrals and anal yellowish white. On the older individuals the markings are obsolescent.

Distinguished from *S. Evermanni* J. B., by the greater number of scales and the larger dorsal and anal, and from *S. Jenkinsii* J. B., by the smaller number of scales, the smaller anal, the coloration, etc.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 "	62.6° F.	Fne. gy. S. G.

CHLOROPHTHALMIDÆ.

Chlorophthalmus mento sp. n.

Plate LIV. figs. 1–1 c.

Br. r. 8; D. 11; A. 11; V. 9; P. 17; Ll. 57–59; Ltr. 7 + 14; Vert. 22 + 27.

This is one of the stoutest known species of the genus; it is compressed, being about three fifths as wide as deep, and tapers from nape and dorsal to snout and tail. The greatest depth is three sixteenths of the entire length. Head large, three elevenths of the total length, rounded across the crown, narrow at the throat, the sides converging rapidly from the middle of the eye, pointed at the snout, nearly one third deeper than wide. Snout long, hardly as long as the eye, chin produced to form the angle at the extremity. Eye large, rather longer than the snout, more than twice the width of the interorbital space. Mouth wide, upper border formed by the intermaxillaries; maxillary not reaching to the middle of the eye, curving up and backward on its hinder margin; lower jaws longer, prominent in front of the upper. Teeth very small, subconical, strongly-hooked, in villiform narrow bands on the jaws, the sides of the vomer, and the forward portions of the palatines. Lingual teeth present, but hardly perceptible. Nostrils small, close together, nearer to the front edge of the eye than to the end of the snout. Interorbital space narrow, less than half as wide as the eye, slightly concave. Opercles thin, flexible. Gill openings very wide; membranes not united, free from the isthmus. Four gills, a slit behind the fourth; laminæ longer than the rakers; rakers six plus twenty-one on the front edge of the first arch, longest not half as long as the eye. Pseudobranchiæ well developed, of about twenty laminæ. Tongue large, free. Vent between the ventrals, a short distance backward of their bases, midway between the eye and the anal fin.

First ray of the dorsal longest, more than half as long as the head, about the length of the snout farther back than the first ray of the pectorals, above the axil of the ventrals. Anal origin two and one fourth lengths of the head from the end of the snout, midway from the back of the eye to the end of the tail. Adipose dorsal above the eighth and the ninth rays of the anal, at the beginning of the posterior third of the entire length. Pectorals narrow, elongate, three fourths as long as the head, reaching as far backward as the dorsal, and farther than the ventrals. Caudal deeply forked.

Scales hard, convex, glossy, marked with fine concentric striæ, subcarinate on the back. Lateral line prominent, nearly straight from the upper edge of the opercle to the base of the caudal.

Stomach filled with small fishes and crustacea; nine pyloric cæca.

Largest specimen seven inches in length.

Olivaceous, darker on the upper half and below the belly; edges of scales lighter, giving the appearance of tranverse streaks; pectorals dark, lighter at the bases; dorsal blackish, lighter in the middle; adipose fin light; ventrals and anal dark, with light extremities; inside of mouth white; linings of gullet, gill chamber, and abdomen black; cheeks more or less silvery.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. M.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 "	48° F.	Fne. gy. S.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8° F.	Gn. M.

Scopelengys dispar sp. n.

Plate LIV. figs. 2–2d.

Br. r. 8; D. 11; A. 12–11; V. 8; P. 15.

The outlines of this species closely resemble those of *Scopelengys tristis,* described and figured by Alcock, 1890; so much so that the most obvious differences appear in the numbers of rays in the dorsal and the anal fins. Body compressed, greatest depth about one fourth of the length from the snout to the base of the caudal. Head two thirds as wide as deep, two sevenths of the total length, slightly convex across the crown and concave in the outline between the nape and the end of the snout. Snout broad, blunt, three times as long as the eye, prominent at the mandibular symphysis and slightly so above the intermaxillaries. Eye small, one tenth as long as the head, less than half as wide as the interorbital space, lateral, touching the outline of the top of head. Mouth very wide, oblique; cleft extending farther backward than the eye; maxillary entirely subtended by the intermaxillary, reaching one diameter of the orbit farther back than the latter, posterior extremity as broad as or broader than the eye. Teeth small, hooked, depressible, in bands of moderate width on the jaws, palatines, and vomer, somewhat paddle-shaped, broadening in the upper half or two fifths as if by a flange at each side of the cusp, rounded, as if for scraping or cutting, rather than acute at the apex (Plate LIV. fig. 2^a–2^b). The vomerine bands are short and are situated at each side of the vomer, extending inward and forward, but separated from one another by a wide space. The palatine bands are very narrow and long. Four gills, a slit behind the fourth; lamellæ well developed, as long as the eye; three rudimentary rakers on the front edge of the upper section of the first arch and six to eight slender rigid acuminate rakers (longest one and one third times as long as the eye), with several rudiments, on the edge of the lower section; membranes narrowly united, free from the isthmus. Pseudobranchiæ rudimentary. Scales large, largest wider than the eye, thin, deciduous, apparently extending forward over the head.

Dorsal originating near the end of the anterior third of the entire length, about halfway from the end of the snout to the adipose fin; hind end of base close to the middle of the total length; longest ray half as long as the head. Vent very little farther back than the base of the dorsal. Anal origin one length of the orbit behind the vent. Adipose fin not fimbriated, above the tenth anal ray. Caudal forked. Ventral origin nearly below that of the dorsal. Pectorals about three fifths as long as the head, near the ventral surface, reaching farther backward than the bases of the ventrals.

A female seven inches in length contains an immense number of minute eggs that judging from their firmness may be nearly mature though not more than one sixty-fourth of an inch in diameter.

Intense black outside and within on the linings of the body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3360	6° 17′ N.	82° 5′ W.	1672 "	36.4° F.	Fne. bk. dk. gn. S.
3382	6° 21′ N.	80° 41′ W.	1793 "	35.8° F.	Gn. M.
3383	7° 21′ N.	79° 2′ W.	1832 "	36° F.	Gn. glob. Oz.

Bathypteroïs ventralis sp. n.

Plate LV. fig. 1.

Br. r. 13 (rarely 12 or 14); D. 13–12; A. 9 (sometimes 10); V. 9 (rarely 10); P. 3 + 13–12 or 14; Ll. 56–59; Ltr. 6 + 9–10.

Though closely allied to *B. pectoralis*, this form appears to represent a smaller species, one that commonly has one or two fewer rays in the dorsal and one to three more in the pectoral, and that has longer rays in the latter. Body long, compressed, depth about one seventh of the entire length. Head one fourth of the total length without the caudal, as wide as deep, with a low arch across the crown, moderately depressed and pointed at the snout. Snout half as long as the maxillary, nearly one third as long as the head, less than the width of the interorbital space, curved at the sides, blunted at the end, very prominent in the lower jaw. Mandibular symphysis slightly produced in front, with a pronounced angle directed backward between the intermaxillaries. Mouth wide, horizontal, reaching backward three fifths to two thirds of the length of the head. Intermaxillaries slender, subtending the maxillaries throughout the cleft of the mouth. Maxillaries slender forward, broadened behind the eye, lower border, behind the intermaxillary, rising in a wide curve to meet the upper edge. Teeth very small, in villiform bands on the jaws, in a group of a few at each side of the vomer and of several on the forward part of each palatine. Eye small, one fifth as long as the snout, one fifteenth of the length of the head, situated at the end of the anterior third of the head. Opercles thin, membranous, covered with scales. Branchiostegal rays thirteen; in one of nine cases there are twelve and in another fourteen on each side. Gill rakers on the first arch 12 + 30 ca., slender, sharp, two thirds as long as the snout. No pyloric cæca. Vent a little more than half way from ventrals to anal.

Seventh ray of the dorsal above the vent, in the middle of the distance from the snout to the base of the caudal; all rays of the fin, when applied to the back, reaching as far back as the hindmost ray. Origin of the anal below the hindmost ray of the dorsal, several of the anterior rays if applied to the body reaching a little farther backward than the hindmost. Adipose dorsal half way from the middle of the dorsal fin to the caudal base. Bases of the ventrals immediately in front of a vertical from the origin of the dorsal; outer two rays much produced, bound together in the greater portion of their length, second a little the longer. Individuals vary much in the length of the ventrals; on some they reach but little if any behind the anal, on others considerably behind the base of the caudal. Pectoral with three rays in the upper portion, two of them reaching beyond the tail, first a little the shorter, free for a short distance from the ends; third ray very short; lower portion of the fin with thirteen to twelve rays (in one case with fourteen on each side), the longest of which reach only about as far backward as the posterior end of the dorsal base. Four fifths of the specimens have thirteen rays in the lower portion of each pectoral. On all of the specimens of greater length than four and one half inches the ventrals reach backward of the anal; on several three and one half inch individuals the ventrals do not reach to the end of the anal. In a female of six inches the eggs are about ready for extrusion; in this case the ventrals reach a little more than half way across the space between the anal and the base of the caudal and the ends of the outer pair of rays are thickened and fleshy as if in special function with the egg laying. The ventrals of a male of six and one half inches in length reach almost to the caudal notch. Caudal wide, deeply forked, lower lobe longer, with a notch below the bases of the lower rays. The difference between the upper and the lower lobes of the tail is hardly perceptible on small specimens, but increases with age.

Blackish, lighter on the fins, the margins of the scales, and the lateral line.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.
3425	21° 19′ N.	106° 24′ W.	680 "	39° F.	Gn. M. and S.

Bathypteroïs pectoralis sp. n.

Plate K, fig. 1.

Br. r. 13; D. 13–14; A. 9; (rarely 10); V. 9; P. 3 + 11 (rarely 10); Ll. 59–62; Ltr. 6 + 9–10.

In form and proportions this species approaches *Bathypteroïs quadrifilis* of Günther. It is closely allied to *B. ventralis* described above, but has one or two more rays in the dorsal and one or two fewer in the pectoral, and the rays of the latter are shorter. Elongate, slender, depth nearly one seventh of the total length, moderately compressed. Head depressed, rather higher than deep at the nape, length one fourth of that from snout to base of caudal. Snout broad, as seen from above curving to a blunt point, wider than deep, length one third of that of the head, about six times that of the eye, or equalling the width of the interorbital space; lower jaws longer. Eye small, one fifteenth as long as the head. Mouth wide, horizontal, extending less than one third of its length backward of the orbit; maxillary reaching about five eighths of the head length, not entering the border of the mouth, broadening downward behind the mandible then curving upward to meet the nearly horizontal superior border in a blunted angle; intermaxillary very long, slender, subtending the maxillary in the mouth cleft. Teeth in villiform bands on mandibles and intermaxillaries, in a small group at each lateral edge of the vomer and in a bunch of several near the front end of each palatine, very small, subconical, slightly hooked, with strong bases. The snout to the back of the eyes is covered with soft, porous, easily detached, light colored skin that may be luminous. A notch at the junction of the intermaxillaries receives the blunt angle behind the mandibular symphysis. Vent half way from the bases of the ventrals to the caudal.

Forward rays of the dorsal when applied to the back reaching as far as the hindmost, seventh ray midway from the snout to the base of the caudal and above the vent, end of the dorsal base above the middle of the space between the vent and the anal. Adipose dorsal half way from the seventh dorsal ray to the base of the caudal. Anal origin half way from the maxillary to the caudal base, fin reaching a vertical from behind the base of the adipose dorsal, anterior rays longest, posterior border concave. Ventrals nearly halfway from the mouth to the anal; outer pair of rays elongate, broadened, compressed, second ray a little the longer, not bound together for a short distance at their ends; third ray more than half as long as the second. No two individuals agree in the lengths of these rays; on the specimen described they extend some distance farther back than the anal, but on others they are much shorter. On some the ventrals reach to the middle of the anal; on others they almost reach the base of the caudal and the ends of the two long rays are thickened and fleshy, possibly in a sexual growth similar to that obtaining on certain Cyprinoids and Cyprinodonts. Upper portion of the pectoral of three rays, two of them very long, bound together in the greater portion of their length, reaching a little farther backward than the caudal fin, the third ray lower, very small; lower portion of eleven (sometimes but ten) free slender rays, some of which extend backward of the adipose fin. Caudal deep, of nineteen rays, deeply forked; lower lobe longer, with a notch at the base of the lowest rays. Scales large, thin, bearing concentric striæ that form complete circles. The largest individual has a length of ten inches.

Blackish; fins, forward portion of the head and edges of scales lighter.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3376	3° 9′ N.	82° 8′ W.	1132 fathoms	36.3° F.	Gy. glob. Oz.
3393	7° 15′ N.	79° 36′ W.	1020 “	36.8° F.	Gn. M.
3407	0° 4′ S.	90° 24′ 30″ W.	885 “	37.2° F.	Glob. Oz.
3431	23° 59′ N.	108° 40′ W.	995 “	37° F.	Lt. bro. M. glob.

Ipnops Agassizii sp. n.

Plate H, fig. 2, 2a.

Br. r. 10; D. 10–9; A. 17–19; V. 8; P. 14; C. 19–21; Ll. 59–60; Ltr. 5.

There is not a great deal of difference in shape between this species and *I. Murrayi.* The most obvious points appear in the longer anal fin, the more forward position of the ventrals and the longer space between the ventrals and the dorsal in the present types. Body long, slender, tapering gradually from the head to the base of the caudal, compressed toward the tail. Head little more than one seventh of the total length, depressed, flattened on the crown, convex on the lower surface, broader than deep. Snout wide, broadly rounded in front, lower jaws forming the anterior edge. Mouth wide, oblique, rising slightly forward; lower jaws curving up in front; maxillary reaching back to the hinder third of the head, not entering the mouth-cleft, broadened posteriorly, upper edge longer and straighter, hinder edge curving forward; intermaxillary thin, slender, bearing teeth to its extremity at the angle of the mouth. Teeth very small, subconical, hooked, with swollen bases, in villiform bands on intermaxillaries and mandibles in a group of four or five short series at each outer angle of the vomer, and in a narrow band at the anterior ends of the palatines. Four gills; laminæ short; rakers of moderate length, slender, pointed, 3 + 18 on the forward edge of the first arch. Gill openings very wide; membranes not united, free from the isthmus. Eyes excessively differentiated, as visual organs, luminous organs, reflectors, and flash lights, occupying nearly half of the top of the head, separated into two facets by a median ridge; with two low obliquely transverse ridges near the hinder edge of each facet, the outer of which turns forward near the median ridge along which it slightly diverges as it proceeds. Vent halfway from the snout to the anal fin. Scales rather large, covering the body and the head from the nape to the luminous organs and the mouth, apparently roughened over their surfaces by minute spines or tubercles.

Dorsal origin backward of the vent about one width of the ventral bases, a little within the anterior third of the distance from the snout to the end of the caudal. Ventrals inserted about midway from the dorsal to the head, reaching a vertical from the first ray of the dorsal or little farther. Origin of the anal halfway from the luminous organs of the head to the end of the tail. Pectorals reaching to the middle of the ventrals.

Largest individual six and one half inches in length.

Blackish, with slight reddish tinge; fins blackish to light brownish or whitish on different individuals; cheek between the light disks (eyes) and the upper jaw steely blue or with a metallic lustre; light organs milk white tinted with golden.

Readily distinguished from *Ipnops Murrayi* by a greater length in the caudal region, a longer anal fin, a smaller number of branchiostegal rays, a greater number of scales in the lateral line, and ventrals farther backward and farther from the dorsal fin.

The specific name is given in honor of Professor Alex. Agassiz.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 6′ W.	1360 fathoms	36° F.	Glob. Oz. dk. Sp.

MYCTOPHIDÆ.

Myctophum oculeum sp. n.

Plate LVI. fig. 2.

Br. r. 10; D. 14 (13–15); A. 15 (14–16); V. 8; Ll. 35; Ltr. 2 + 1 + 4.

Moderately elongate and compressed, depth more than one sixth of the total length. Head about one fourth of the length from snout to end of caudal, more than half as wide as deep, somewhat pointed in front, somewhat convex on the forehead. Snout short, blunt, three fifths of the length of the eye, convex on the top, with a pronounced median internarial keel. Eye large, one fourth as long as the head, as wide as the interorbital space.

Mouth wide, two and two fifths times as long as the eye; intermaxillary very slender, forming the entire upper edge of the mouth; maxillary extending one diameter of the eye backward of the orbit. Opercles large, elongate, membranous in the greater part of their extent.

Dorsal origin half way from the snout to the base of the caudal. Origin of the anal below the tenth ray of the dorsal. Adipose fin above the hindmost rays of the anal. Ventrals little backward of midway from the isthmus to the first ray of the anal. On one specimen the ventrals were never developed.

Scales large, smooth, those of the lateral line wider.

Of the luminous organs, the lanterns, there is one on the interorbital area immediately behind the rostral keel; there are three in the branchiostegal series the hindmost being lower than the other two; there is one behind the end of the maxillary, below which at the angle of the mouth lies a smaller one; there is one upon the base of the pectoral, above and forward on the lateral line another, and below and forward from the pectoral a third; on the lateral line the second of its series lies above and backward from the ventral base, the third above the fifth ray of the anal, the fourth above the hinder extremity of the base of the anal, and the fifth a little above the median line on the base of the caudal; there are four between the isthmus and the ventrals, of which the third is farther out than the others; from the ventrals to the anal there are three; at the side of the anal there are five or six, the hindmost one being farther out; at the lower part of the side of the caudal pedicel there are eight, the last situated up a short distance on the caudal base; behind the end of the operculum half way to the ventrals there is a single lantern; and above the axil of the ventrals on the lower part of the side lies the foremost of a series of five of which the fourth is near the first, and the fifth near the next to the hindmost ray of the anal. A large elongate organ apparently luminous extends from the adipose fin to the caudal and a longer one from the base of the anal backward to the tail.

Black; fins lighter; scales lustrous.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.
3366	5° 30′ N.	86° 45′ W.	1067 "	37° F.	Yl. glob. Oz.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 "	35.8° F.	Gn. M.
3387	7° 40′ N.	79° 17′ 50″ W.	127 "	56.2° F.	Fne. gy. S.
2619 (Hyd.)	7° 31′ N.	78° 42′ 30″ W.	1100 "	36.5° F.	
3388	7° 6′ N.	79° 48′ W.	1168 "	36.2° F.	Gn. glob. Oz.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 fathoms	42.3° F.	R. glob. Oz.
3433	25° 26′ 15″ N.	109° 48′ W.	1218 "	36.5° F.	Br. M. bk. Sp.
3435	26° 48′ N.	110° 45′ 20″ W.	859 "	37.3° F.	Br. M. bk. Sp.
3436	27° 34′ N.	110° 53′ 40″ W.	905 "	37.2° F.	Br. M. bk. Sp.
3437	About 50 miles S. of Guaymas		628 "	40° F.	Submarine townet [on the bottom.
"No. 138"	32° 17′ N.	135° 49′ W.	Surface.		

Myctophum tenuiculum sp. n.

Plate J, fig. 5.

D. 12–11; A. 19; V. 7; P. 13–12; Ll. 39–41; Ltr. 2 + 1 + 4.

Body compressed, elongate, very slender near the caudal fin, depth three thirteenths of the length to the base of the caudal. Head narrow, deep, three elevenths of the entire length to the bases of the caudal rays. Snout short, half as long as the eye, blunt, prominent and slightly overhanging the front of the mouth. Eye, large, twice the length of the snout, less than one third of the length of the head, as wide as the interorbital space, one half as long as the maxillary. Mouth large; a vertical from its middle passes through the middle of the eye; maxillary extending backward of the orbit about half the diameter of the eye.

The fifth ray of the dorsal is midway from the snout to the base of the caudal, and the eighth is above the first ray of the anal fin. The adipose dorsal is above the hindmost three rays of the anal. The bases of the ventrals are forward of the dorsal. Pectorals small, reaching backward of the bases of the ventrals. Caudal forked, pedicel long, narrow, slender, portion between the adipose fin and the bases of the long rays of the caudal equal to four fifths of the length of the head.

Scales large, smooth, those on the lateral line larger.

A single lantern occupies the middle of the interorbital space; on each side there are three lanterns in the branchiostegal series; a minute one lies at the angle of the mouth with a larger one just above it behind the maxillary; one is situated at the lower edge of the base of the pectoral, another close above it forward of the upper ray of the fin and a third a short distance below and forward under the opercular edge; none visible on the isthmus; five between the isthmus and the ventrals; four between the ventrals and the anal; on the flank about one scale-width above these last a series of three the foremost of which lies above the base of the ventral; a single one above the vent near the lateral line; eighteen between the vent and the base of the caudal, of which the two below the base of the caudal are separated from those in front of them and of which the sixth is followed by an interspace above which a lantern lies near the lateral line. There are indications of a very small luminous organ between the front edge of the eye and the upper jaw and of another between the hind border of the orbit and the maxillary; both are indistinct. Near the base of the anal several of the subcaudal scales have the appearance of covering mucous or luminous chambers.

Length one and three sixteenths inches.

Sides of head and body brilliant with an iridescent bluish or pearly lustre; belly darker; back brownish; nasal sacs light; fins light.

Station.	Latitude.	Longitude.		Temperature.
3382	6° 21′ N.	80° 41′ W.	Surface	75° F.

Myctophum luminosum sp. n.

Plate LV. fig. 2.

Br. r. 8; D. 16; A. 14; V. 8; P. 16; Ll. 35; Ltr. 3 7.

Form moderately stout and compressed, with regular outlines, greatest depth about one fifth of the entire length; caudal pedicel half as deep as the body; body cavity nearly half of the total distance from snout to end of caudal. Head medium, rounded, close upon one fourth of the entire length, half as wide and two thirds as deep as long. Snout short, blunt, very convex, with a prominent median internarial ridge that is not continuous backward in the middle of the interorbital space. Eye large, one fifth as long as the head, one and one third times as long as the snout, one half as wide as the interorbital space, situated immediately forward of a vertical from the middle of the upper jaw, covered above by a bony expansion from the skull passing backward as a keel at each side of the crown to end in a spine at the upper extremity of a ridge going down around the angle of the mouth. Forehead with a mucous cavity in the middle of the interorbital space and with another about each nasal sac, all of which are probably luminous. Mouth wide, two thirds or more of the length of the head. Teeth small, in bands on the jaws and in narrower ones on the palatines; and in a single short series of very small teeth on each side of the vomer. A few of the anterior teeth of the inner series on the palatines are larger. Nostrils small, anterior smaller, close together, halfway from the eye to the end of the snout. Opercular bones thin, with an angular projection above the bases of the pectorals. Scales large, smooth, thin, subequal, deciduous.

Dorsal origin forward of the total midlength, distant from the snout one and one half times the length of the head; base little more than half as long as the head; anterior three rays short. Adipose dorsal distant from the caudal base three fourths of the length of the head, above the hindmost two or three rays of the anal, narrow, acuminate. Pectorals narrow, two thirds as long as the head, reaching behind the bases of the ventrals. Vent below the hinder end of the base of the dorsal. Ventrals halfway from the pectorals to the vent, inserted below the third ray of the dorsal, reaching the base of the anal. Anal origin very little farther back than the last ray of the dorsal; basal length little less than that of the dorsal.

There is a large irregular shaped luminous organ above the caudal pedicel and another below it. The small light organs are distributed as follows: on each side of the body there are two, possibly three in the branchiostegal series; one lies on the base of the pectoral, below it a short distance a second and above near the lateral line a third with it form a right line; from the isthmus to the base of the ventral there are four, and above the third of these there are two, the uppermost of which attains the level of the middle of the pectoral base; between the ventrals and the anal there are five and from the fifth a series of three leads up and backward to the lateral line; on each side of the base of the anal there are six and above the sixth near the lateral line lies a single one backward of which on the base of the caudal at the end of the line lies another.

Intense black; fins lighter toward the outer edges.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 fathoms	42.3°	R. glob. Oz.

Myctophum aurolaternatum sp. n.

Plate LV. fig. 3.

Br. r. 9; D. 13 (12–14); A. 23–24; V. 9; P. 14; Ll. 45–47; Ltr. 3 + 1 + 4.

Moderately elongate, slender and compressed, depth one fifth of the length to the base of the caudal, width three fourths of the depth. Head little less than one fourth of the total length, convex on the crown, narrowing slightly toward the throat. Snout short, hardly more than half as long as the eye, narrower than deep, bluntly rounded in front, internarial keel on the skull low. Eye large, twice as long as the snout, one and one fourth times as wide as the interorbital space, nearly one third of the length of the head; orbit not cutting into the upper profile. Mouth wide, reaching more than halfway from the snout to the base of the pectoral, about twice as long as the eye; maxillary reaching backward of the orbit one half the ocular diameter. Teeth small, in narrow villiform bands on intermaxillaries, dentaries, and palatines, and in a small group at each side of the vomer. Gill openings wide; membranes hardly united, free from the isthmus. Gill rakers more than half as long as the eye, slender, compressed, five plus thirteen. Preopercular ridge low, no spine at its junction with the postorbital ridge. Scales large, larger on the lateral line, three above the line and four below it, seven to nine from the adipose fin to the caudal.

Third ray of the dorsal fin midway from the snout to the base of the caudal; basal length less than one and one half times the length of the eye, base above the middle of the space between the ventrals and the anal. Adipose fin distant from the base of the first dorsal one and one half lengths of the latter, or from the base of the caudal one length of the dorsal base which is half the length of the head. Ventral base slightly in advance of the vertical from the first ray of the dorsal. Anal origin little backward of the last ray of the dorsal; anterior two rays and all those behind the middle of the fin short; hindmost three rays below the adipose fin. Caudal deeply forked.

The arrangement of the lanterns, light organs, light facets, etc., does not differ very much from that seen on *Myctophum Caninianum*. There are three to four facets in the mandibular and branchiostegal series; a small one lies at the end of the mouth cleft and a larger one above it at the end of the maxillary; one lies on the base of the pectoral, above and forward of it at the edge of the operculum halfway to the lateral line another, and below and forward half way to the ventral series a third; one lies at the origin of the ventral and above it midway to the lateral line another; above the vent there is a series of three, the uppermost a little below the line, and behind this upper one halfway to the base of the caudal, close to the line, there is a single one; in the ventral series there are four from the isthmus to the ventrals, four from the ventrals to the anal, ten along the base of the anal fin, six below each side of the caudal pedicel, and two at the base of the caudal. Three considerable spaces separate the groups backward of the vent, the lanterns being quite close together in each group.

The scales behind the adipose dorsal, appear to cover luminous bodies; the adipose fin, and mucous matter in the cavity in the middle of the interorbital space and around the nasal sacs probably also are luminous. The iris has the golden color of the lanterns and if not luminous itself must act as a reflector.

Brilliant iridescent bluish to silvery and golden on the scales and head, blackish when the scales are lost, darker on the back, lighter on the fins, whitish on the snout; lanterns and iris golden.

Station.	Latitude.	Longitude.		Temperature.
3382	6° 21′ N.	80° 41′ W.	Surface	75° F.

Myctophum nitidulum sp. n.

Plate LVI. fig. 3.

D. 12; A. 19; V. 8; P. 13; Ll. 40.

This species is somewhat closely allied to *M. Caninianum* C. V. The differences in shape, position of fins, and in the numbers of rays and of scales are small, and the arrangements of the lanterns present great similarities in the two species; but there are dissimilarities in the groupings of the lanterns that, taken in connection with the slight variations in the numbers of the lanterns, of the rays, and of the scales and in the shape of the head, make it necessary to describe and figure this form as distinct. The body is quite as slender as that of *M. Caninianum*, but the head is rather more full and blunt on the snout, the eye is smaller, and the number of lanterns in the post anal group, Lütken's *anales posteriores*, is five instead of eight. Another form to which the present bears considerable resemblance is *M. affinis* Lütk., which has the same numbers of lanterns in the groups, but has a less distinct separation of one group from another, and the eye is larger, the snout shorter and less pointed and the number of scales in the lateral line is smaller in that species.

Body and head compressed, caudal region of moderate slenderness. Length of head one fourth and depth of head two elevenths of the total length. Mouth wide; maxillary two thirds as long as the head, hardly expanded at the end. Eye large, little less than one third of the length ot the head. Anal origin slightly forward of the middle of the entire length, third or fourth ray below the base of the hindmost ray of the dorsal. First dorsal ray midway from the snout to the middle of the distance from the adipose dorsal to the caudal. Pectorals short, reaching nearly half way to the anal. Scales smooth, those of the lateral line enlarged. The lanterns are as figured on Plate LVI., fig. 3; there are no luminous bodies on the top of the caudal region.

Lustrous brownish on the back; bluish on the upper portions of the sides, shading to lighter below; light colored about the nasal sacs and on the interorbital space.

Latitude.	Longitude.
27° 50′ N	145° 45′ 30″ W.

Myctophum laternatum sp. n.

Plate LVI. fig. 1.

D. 11 (11–12); A. 16 (16–15); V. 8;

Somewhat stout and short, compressed, depth about one fourth of the total length. Head deep, nearly one third of the length from the snout to the base of the caudal. Snout very blunt, deep, short, about one fourth as long as the eye, profile nearly vertical in front, a median internarial ridge. Eye large, one third of the length of the head, one and one half times as wide as the interorbital space, four times as long as the snout. Mouth wide; maxillary extending little behind the orbit. Opercles broad, thin.

Dorsal origin near midway from snout to base of caudal. Anal origin below the hindmost rays of the dorsal. Adipose fin above the posterior half of the anal. Ventrals little backward of midway from the bases of the pectorals to the origin of the dorsal. Pectorals reaching behind the bases of the ventrals. Caudal forked.

The lanterns are disposed somewhat as follows: one on the middle of the interorbital space; three in each branchiostegal series, the anterior being particularly distinct below the chin; a small one at the hind end of the maxillary, and a larger one above it backward from the lower portion of the orbit; one on the lower part of the base of the pectoral, another above this at the margin of the opercle, and a third below and forward at the opercular edge; five in the series from the isthmus to the base of the ventral; a single one above the base of the ventral half way to the lateral line; four in the series from the ventrals to the anal; three in a series from the vent up and backward to the lateral line; behind the vent at the side of the anal there is a series of six separated by a short space from another series of three, which latter is separated from the two lanterns on the lower part of the base of the caudal; and above the sixth of the anal series on the lateral line there is a single one. On the caudal pedicel there is a luminous patch of varying extent behind the adipose and another behind the anal fin.

Blackish; fins lighter; opercles silvery; iris brilliant with metallic reflections.

Station.	Latitude.	Longitude.	Depth.	Temperature.
3414	10° 14′ N.	96° 28′ W.	Surface to 200 fathoms.	
3388	7° 6′ N.	79° 48′ W.	1168 "	36.2° F.
3437	27° 39′ 40″ N.	111° 0′ 30″ W.	628 "	40° F.

Myctophum atratum sp. n.

D. 12; A. 19; V. 8; P. 14; Ll. 40.

There is so much resemblance between this fish and that described by Cocco, 1838, as *Scopelus Benoisti* that it would perhaps be better described by comparisons that shall set forth the respects in which it differs from Cocco's species. Accepting for the purpose the identification and figure given by Lütken in his admirable work on the Scopelini, in the Spolia Atlantica, 1892, it will be seen that in the outlines of the body, in the size of the eye, in the formulæ, the length of the pectorals, the positions of dorsal and anal fins and of the lanterns, in the two lanterns at the base of the caudal, and in other features the two forms agree tolerably well. On *M. atratum*, however, the shape is a little less compressed, the lanterns at the base of the caudal are farther apart — the upper of the two being on the end of the lateral line, the luminous organ on the upper edge of the caudal pedicel is smaller and nearer the caudal fin, the series of four lanterns from the lower part of the base of the pectoral directly backward to a point above the origin of the anal has a larger distance between the first and second lanterns — it being equal to the space occupied by the hinder three, the group of three in the lower part of the cheek behind the maxillary more nearly forms an equilateral triangle, and there are but five lanterns in the posterior anal series. Apparently the eye is a trifle larger, being rather more than two fifths of the length of the head, and it interferes somewhat more in the profile of the crown. The middle of the interorbital space is occupied by a luminous organ. The maxillary is broad at the hind extremity, is rounded superiorly on the posterior margin, and extends very little farther backward than the orbit. The scales are large, thin, smooth, and deciduous; those on the lateral line are much differentiated.

Body black, lighter and silvery on the lower portions of the head and the anterior parts of the abdomen; fins lighter, adipose possibly luminous; nasal sacs lighter.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3433	25° 26′ 15″ N.	109° 48′ W.	1218 fathoms	36.5° F.	Br. M. bk. Sp.

STOMIATOIDS.

Little is known of the habits of any of the fishes which for convenience are placed together in this group. Specimens picked up from the surface of the ocean have led to the conclusion that they live near the surface and are nocturnal; on the other hand, structure, colors, and the fact that the specimens taken have commonly been secured over the deep sea or in dredges operating at great depths, rather than on the shoals, favors the idea of a bathybial habitat. The position of the barbel below the head and of the lanterns below the body, in function downward, would indicate a dwelling place at some distance off rather than immediately on the floor of the sea. Up to date the horizontal distribution has included the tropical and the temperate regions of the Atlantic, the Pacific, and the Indian Ocean, its greatest extension toward the poles being by way of the Gulf Stream and the Mediterranean. The group has not yet been reported from the south Atlantic, or the southeastern Pacific. Vertically, if the specimens entered the dredges at the bottom, the different genera range down to more than two thousand fathoms. There is little in the recorded bottom temperatures of the stations that might preclude a polar distribution; but the possibility exists that the waters of the actual habitat are nearer the surface and much warmer, a supposition which will account for the peculiarities of the horizontal distribution as now established.

Of the six species in the present collection five are apparently new. One of the five is a very distinct species of the distantly related genus Chauliodus; it is described below, with a species from the Society Islands, and remarks are there made concerning these and other species of the family Chauliodidæ. Three of the five new species belong to the comparatively well known genus Stomias; and another represents a new genus, Dactylostomias, in which the head resembles that of Astronesthes and the body that of Stomias. In this new genus the pectoral is more degraded than those of Opostomias or of Echiostoma since the fin properly so called has disappeared and left only the single long filamentary ray. The nearest ally of Dactylostomias is probably Grammatostomias, from the northwestern Atlantic, in which genus however the pectoral fin has been retained without the detached or isolated ray.

CHAULIODIDÆ.

Chauliodidæ Bonap., 1845; *Chauliodontidæ* Bonap., 1846.

The barbel possessed by the species of the genus Chauliodus has apparently been entirely overlooked by all authors who have dealt with the members of this family. The organ is small but distinct on the comparatively well known species *Chauliodus Sloani*, and is rather more distinct on other forms (see Plate K, figs. 3 and 2a, on which it is outlined from below as seen on *C. barbatus* and *C. Sloani*). It is a fleshy, pointed, worm-like appendage situated on the chin between the angles on the lower edge of the lower jaws. It is translucent and contains a series of isolated black bodies, each of which bears a reflecting facet on the lower (hinder) side. A larger luminous organ rests below the base, and more or less backward from this there are two others. From the muscles used in the control of its movements, its function is probably one of considerable importance. In classification the presence of the barbel necessitates the removal of the genus farther from Gonostoma and other Sternoptychoids, and places it nearer to the Stomiatoids. It emphasizes the necessity of adopting Bonaparte's family, the Chauliodidæ. On all of the five or six known species an adipose dorsal fin is present. The various published figures representing Chauliodus without this fin are incorrect (for instances see Bl. Schn., 1801, pl. 85, — Shaw, 1804, V, pl. 111, — Swainson, 1838, I, fig. 65, — Valenciennes, 1850, pl. 97, fig. 3). On the other hand those illustrations which represent species of Chauliodus with a second dorsal containing rays like those of the anal fin are equally erroneous (see Risso, 1826, III., fig. 37, — Bonaparte, 1841, Fauna Ital., — Günther, 1880, Introduction, fig. 285).

These fishes no doubt frequent considerable depths, but whether they habitually stay close to the bottom is still an open question. The greatest depths were assigned them by the "Challenger," northeast of the Bermudas, at 2575 fathoms, and north of New Guinea, at 2000 fathoms. By the "Investigator," they were taken, in the Bay of Bengal, at 1590, and by the "Albatross," between Central America and the Galapagos Islands at 1201 fathoms. Representatives were also taken south of New Guinea, by the "Challenger," at 800, off the coasts of Morocco, by the "Talisman," at 614, and by the "Albatross," off Alaska, at 876 fathoms. An apparently new species for which no definite depth is known is described below. The distribution for the entire family, both horizontal and vertical is sufficiently apparent in the list of species.

Chauliodus barbatus sp. n.

Plate K, fig. 2, 2a.

Br. r. 22; D. 6; A. 12–13; V. 7; P. 11; Ll. 61.

Moderately elongate, compressed, greatest depth nearly one seventh and greatest width one eighteenth of the total length, tapering to a depth of one thirty-sixth and a width of half as much in the caudal pedicel. Head short, as deep as long, profile slightly concave above the snout and indented at the end of the chin in front of the barbel, convex across the crown. Snout blunt, about twice as long as the eye, with an angular prominence at the symphysis of the lower jaws. Eye medium, two elevenths of the length of the head. Mouth large, lower jaws little shorter than the head, oblique, intermaxillaries forming more than half of the upper border. Teeth few large and fang-like on intermaxillaries and dentaries, numerous, small, comb-like and inclined backward on the maxillaries. On each intermaxillary there are four fangs, the longest twice the length of the eye. Not counting the very small one at the symphysis there are seven fangs on each lower jaw, the foremost half as long as the head and the others decreasing in size backwards. On each palatine there are two small widely separated teeth, and directed outward from the base of the largest fang in the upper jaw there is a single tooth. Nostrils small, close together, nearer to the upper part of the eye than to the end of the snout, anterior smaller. Barbel with a rigid cartilage, half as long as the eye, resting with the free end forward in the notch at the end of the chin where it is further protected by the folds of the skin and the bones between which it lies. Gills four, a short slit behind the fourth; lamellæ short; rakers obsolete; arches weak; openings very wide; membranes free, not united to the isthmus.

Operculum thin, broad and short. Three pyloric cæca. Scale marks present, but the scales apparently reduced to membrane.

Dorsal short; first ray probably long, at the end of the anterior fourth of the total length; base high forward, one third longer than the orbit. Adipose fin rather long; above the hinder half of the anal. Anal in the hindmost third of the length; base twice as long as that of the dorsal, separated from the bases of the longest rays of the caudal by about two thirds of the length of the head; fin deepest anteriorly. Caudal pedicel deepening toward the bases of the rays; fin deeply notched. Pectorals narrow, low on the side, not reaching the bases of the ventrals. Ventrals narrow, long, inserted about half way from the snout to the anal.

In each of the branchiostegal series there are twenty of the luminous organs; at each side of the body the lower series of the light facets contains eight at the side of the isthmus, nineteen between the isthmus and the ventrals, twenty-two to twenty-three between the ventrals and the anal, and eleven from the origin of the anal to the base of the caudal; and in the upper series there are seventeen to nineteen from the gill opening to the ventrals and twenty-two to twenty-three from the ventrals to the anal. As in *C. Sloani*, there is a multitude of very small light organs, mere dots, but similar to the large ones, amongst those of the two main series; for instances, at each side of the bases of the pectorals in somewhat regular rows, or in the groups of four, more or less, between the large series. A single yellow (red) facet is situated between the eye and the hinder extremity of the intermaxillary, and a single black one immediately below the forward part of the eye (resembling that in Gonostoma).

Black; tinted with gold on the flank and iris, with red on the sides of the lower jaw and on the light facet back of the eye, and with greenish on the anterior glands of the two main series; fins brownish to blackish.

This species appears to be shorter and stouter than *Chauliodus Sloani* Bl. Schn., the barbel is more developed, and the luminous disks are not so numerous; from the shoulder to the vent in each of the upper series there are thirty-nine to forty light organs, of which seventeen are between the shoulder and the ventral, and in each of the lower series there are sixty to sixty-one, forty-nine of which are from the hyoid to the vent, or twenty-seven to twenty-eight of which are from the hyoid to the ventral; but in *C. Sloani* there are forty-four to forty-six from the shoulder to the vent, nineteen to twenty of which are between the shoulder and the ventral, in the upper series, and in the lower there are sixty-four to sixty-seven, fifty-three to fifty-four of which are from the hyoid to the vent, or twenty-nine to thirty of which are from the hyoid to the ventral. A peculiar feature seen in the branchiostegal series of *C. Sloani*, not patent in that of *C. barbatus*, is the apparent change in the functional direction of the sixth to the thirteenth light facets from outward and downward to within the mouth at the side of the hyoid, and the appearance below them in the branchiostegal membrane of a series of very small facets as if to continue the series as seen from the outside and from below. The narrow pectorals, the deeper notch in the chin and the backward position of the dorsal by themselves serve to distinguish *C. barbatus* from either *C. Sloani* or *C. dentatus*.

Station	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3359	6° 22′ 20″ N.	81° 52′ W.	465 fathoms	42° F.	Rky.
3375	2° 34′ N.	82° 29′ W.	1201 “	36.6° F.	Gy. glob. Oz.
3376	3° 9′ N.	82° 8′ W.	1132 “	36.3° F.	Gy. glob. Oz.

Chauliodus dentatus sp. n.

Br. r. 20; D. 6; A. 13; V. 7; P. 14–15; Ll. 64.

This is one of the more elongate species of the genus. It is much more slender than *Chauliodus barbatus* sp. n., has not so large a notch on the chin, has the dorsal nearer the head, has a broader pectoral, has a longer caudal region, and has larger numbers of luminous organs in the two main series. It has a smaller eye, a wider pectoral fin, and a longer body than *C. pammelas* Alc.; it has a longer anal fin, and a longer lateral line than *C. Maccouni* Bean; and it has a longer anal fin and a longer caudal region than *C. Sloani* Bl. Schn.

Form slender and compressed; depth of head about one ninth, length of head about one eighth, and length of the caudal region somewhat less than one fifth of the entire length. The distance from the snout to the ventrals is a little less than half of that from the snout to the anal fin. The orbit is about two ninths, and the longest mandibular fang is nearly one half as long as the head. Crown convex; profile decidedly concave in front of the eye. The short compressed maxillary teeth are stouter and less numerous than those of *C. barbatus;* they are stouter and more erect than those of *C. Sloani*. The hinder of the luminous glands below the eye is not so far backward from the orbit as that on *C. barbatus*. On the latter the pores of the lateral line are minute, several to half a dozen appearing on each scale, but on *C. dentatus* there are apparently but two on each scale, each pair being placed close together on a single black spot. The barbel is similar to that of *C. Sloani.* The number of lanterns in the branchiostegal series is eighteen, two less than is seen on *C. barbatus.* Total length seven and three fourths inches.

Type sent by Mr. Andrew Garrett from the Society Islands.

The following formulæ will indicate some of the differences among the described species of the genus. The lower series of lanterns (l. s. l.) are enumerated from the forward end of the isthmus to the humeral symphysis, from the symphysis to the ventrals, from the ventrals to the anal, and from the origin of the anal to the caudal; and the upper series (u. s. l.) is counted from the pectoral to the ventrals and from the latter to the anal.

C. barbatus, Br. r. 22; D. 6; A. 12–13; V. 7; P. 11; Ll. 61; l. s. l. 8 + 19 + 22–23 + 11; u. s. l. 17–19 + 22–23.

C. dentatus, Br. r. 20; D. 6; A. 13; V. 7; P. 14; Ll. 64; l. s. l. 8 + 29 + 14; u. s. l. 19 + 29.

C. Sloani, Br. r. 20; D. 6; A. 11; V. 7; P. 14; Ll. 56; l. s. l. 8 + 20–22 + 23–26 + 11; u. s. l. 19 + 24–27.

C. Maccouni, D. 6; A. 11; V. 7; P. 13; Ll. 56.

C. pammelas, Br. r. 16; D. 6; A. 12; V. 7; P. 11–12.

STOMIATIDÆ.

STOMIAS.

Stomias Cuvier, 1817, R. An., II, 184.

Ten species of this genus are more or less perfectly established. Three of these are found in the present material and are described and figured below. Another of the ten, *Stomias gracilis*, is named from a specimen taken by the "Challenger," south of Australia, and placed in the species *Stomias boa* Risso. The differences noted by Günther in his report of the specimen hardly permit retention with the Mediterranean species. The number of species may be reduced by study of variations, but for the time they are distinguished as follows:

Caudal	pointed;	D. 19;	A. 21;	P. short, V. long	*elongatus.*
“	“	D. 18;	A. 18;	P. & V. elongate; Ll. 88	*gracilis.*
“	“	D. 18;	A. 19;	P. short, V. elongate; Ll. 72	*boa.*
“	rounded;	D. 17;	A. 21;	P. & V. not long	*ferox.*
“	concave;	D. 17;	A. 21;	P. short, V. long	*nebulosus.*
“	“	D. 17;	A. 20;	P. medium, V. long	*affinis.*
“	forked;	D. 9;	A. 13;	P. & V. small	*barbatus.*
“	“	D. 15;	A. 19;	P. & V. short	*atriventer.*
“	“	D. 19;	A. 23;	P. short, V. longer; Ll. 67	*hexagonatus.*
“	“	D. 18;	A. 21;	P. & V. medium	*colubrinus.*

Stomias colubrinus sp. n.

Plate LVII. fig. 1.

Br. r. 18; D. 18; A. 21; V. 5; P. 6.

Body long, slender, compressed, abdominal chamber extending far behind the middle of the total length, depth about one eleventh of the length from snout to end of caudal. Head short, nearly one eighth of the entire length, chin long, forehead short. Snout little longer than the orbit. Mouth very wide; lower jaws prominent, curving up forward, little shorter than the head. Teeth slender, pointed, some of those on the jaws depressible; each intermaxillary with five teeth, of which the first and third are smallest and the second largest; maxillary denticulate where forming the edge of the mouth; lower jaw with ten to twelve teeth of which the anterior three are smallest and the second three largest, denticulate backward of the twelve. A large hooked fang at each side of the vomer and directly backward from each of these a similar fang on the forward end of each palatine. Tongue rudimentary, toothless. Eye little less than one sixth as long as the head, two thirds of the length of the snout, length four fifths of the interorbital width. Four gills; no pseudobranchiæ; gill openings very wide; gill membranes not united, free from the isthmus. Opercles membranous. Hyoid barbel slender, hardly as long as the head, with a luminous bulb three fourths of the length from the chin, extending beyond the bulb in a couple of filaments or tentacles.

Dorsal origin about one length of the head forward of the caudal, above the third ray of the anal fin, last ray above the eighteenth ray of the anal. Caudal forked, lower lobe much stronger, five short rays above the base and but one below it. Base of ventral distant from the anal one length of the head, fin length four fifths of the distance from the anal, shape narrow, pointed. Pectorals narrow, prolonged in a filament, total length less than that of the head, inserted near the ventral surface.

Light organs small, the largest being that between the eye and the maxillary; forty-nine in the humeral series, from the shoulder to the vent, of these thirty-nine are forward of the ventrals; seventy-six between the isthmus and the caudal in the lower series, of which fifty-nine are forward of the vent, forty-nine forward of the ventrals, and ten below the isthmus.

Intense black; fins lighter; tongue white.

Entire length ten and one half inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3360	6° 17′ N.	82° 5′ W.	1672 fathoms	36.4° F.	Fne. bk. dk. gn. S.

Stomias hexagonatus sp. n.

Plate LVI. fig. 5.

Br. r. 16; D. 19; A. 23–24; V. 5; P. 6; Ll. 67; Ltr. 9.

Moderately elongate and compressed, depth about one ninth and length of head nearly one sixth of the entire length. Mouth nearly as long as the head, each intermaxillary with five unequal fang-like teeth, second longest. Maxillary forming the edge of the mouth posteriorly, with denticulations. Mandibles with about seven (7–9) longer teeth followed by denticles toward the angle of the mouth. Vomer with a fang at each side of the forward end. Each palatine with a fang behind the vomerine tooth. No teeth on the tongue. Barbel as long as the lower jaws, distal third of the length bifid in a pair of slender extremities, basal portion ending in a luminous bulb.

A series of forty-seven luminous facets extends from the shoulder to a point above the vent; another series from the isthmus contains sixty-seven, of which forty-eight are forward of the anal; the series at the side of the isthmus contains a dozen or more, and in each branchiostegal series there are sixteen. Besides the luminous spots in the regular series there are many other smaller ones scattered over the body and the head. Most of them are on the lower half, but in the six uppermost series of scale areas there is generally a single spot on the middle of each scale, some have two or more. On each of the hexagons below the third series the dots are more numerous, from four to six. Each of the smaller scattered spots is surrounded by a ring of black pigment that shows best where the skin has been rubbed. There are sixty-seven of the hexagonal areas between the humerus and the caudal, and nine between the median line of the back and that of the belly.

Dorsal origin nearly one length of the head forward of the base of the caudal, above the third ray of the anal; base ending above the eighteenth anal ray. The bases of caudal and dorsal are separated by a space of the length of the orbit; the space between the bases of anal and caudal is about half as long. Caudal forked, with seven short rays above the base and three below. Ventrals as long as the mouth, narrow, of five rays, longest reaching to the vent, bases distant from the anal one length of its base. Pectorals not differing much in size from the ventrals, of six rays. Though two is the most common number of tentacles at the end of the barbel instances of one more or less are not rare: in a single lot from a particular locality there are three forms, one with one, another with two and a third with three tentacles.

Dark brown or blackish, belly black, fins lighter.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.
3358	6° 30′ N.	81° 44′ W.	555 "	40.2° F.	Gn. S.
3361	6° 10′ N.	83° 6′ W.	1471 "	36.6° F.	Gn. Oz.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 "	36.8° F.	Gn. M. S. rky.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 "	54.8° F.	Rks. and S.
3383	7° 21′ N.	79° 2′ W.	1832 "	36° F.	Gn. glob. Oz.
3385	7° 32′ 36″ N,	79° 16′ W.	286 "	45.9° F.	Gn. M.
3388	7° 6′ N.	79° 48′ W.	1168 "	36.2° F.	Gn. glob. Oz.
3414	10° 14′ N..	96° 28′ W.	2232 "	35.8° F.	Gn. M.

Stomias atriventer sp. n.

Plate LVI. fig. 4.

Br. r. 18; D. 15; A. 19; V. 5; P. 6.

Elongate, slender, somewhat compressed, depth one twelfth and length of head one tenth of the distance from the snout to the base of the caudal. Eye large, width equal to that of the interorbital space or to the length of the snout, one fourth as long as the jaws, little less than one fourth as long as the head, located immediately in front of a vertical through the middle of the upper jaw. Mouth large, upper jaw about four times as long as the eye. Teeth hooked, fang-like; each intermaxillary with five teeth, anterior smallest, second largest and equalling about three fourths of the length of the orbit; the narrow maxillary denticulate in its posterior half; mandible with seven teeth, anterior and posterior small, third as large as the second upper; head of vomer with one fang at each side; each of the very crooked palatines bears two fangs, the anterior directly backward from the vomerine tooth; no lingual teeth. Barbel fleshy and rather thick in the entire basal portion; distal portion, one fourth of the length, trifid; proximal section ending in a luminous bulb from which the three extremities start.

Dorsal origin little if any more than a length of the head from the base of the caudal, above the fourth anal ray; base of fin separated from the short rays of the caudal by the length of the orbit; longest rays reaching the base of the caudal. Four of the anal rays lie behind a vertical from the last ray of the dorsal, longest ray extending to the base of the longest ray of the caudal. Ventrals small, of five rays, inserted at four fifths of the distance from the pectorals to the caudal base, reaching little more than half way to the anal origin. Pectorals small, of six rays, nearly or quite as long as the ventrals, situated low on the flank. Caudal forked.

A large luminous organ below and backward of the eye between it and the maxillary; eighteen similar organs form a series at the bases of the branchiostegal rays; at each side of the isthmus there are nine more; on the body in each ventral series there are forty-three from the isthmus to the ventrals, twelve from the ventrals to the anal, and sixteen from the origin of the anal to the base of the caudal, that is eighty in the entire series; in the series from the shoulder there are thirty-nine of the light organs forward of the ventrals, and twelve from the latter to the origin of the anal.

As in *S. hexagonatus*, this species is marked with hexagonal areas, in each of which there is a black spot including a white dot. General appearance blackish, with lighter fins. The barbel is whitish to the trident which is black. Scattered dots of white over the ventral surface recall what obtains on *S. hexagonatus* though the spots are much smaller and much less numerous in the present species.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3133	25° 26′ 15″ N.	109° 48′ W.	1218 fathoms	36.5° F.	Br. M. bk. Sp.

DACTYLOSTOMIAS gen. n.

Body compressed, elongate, scaleless; vent far behind the middle. Head narrow, pointed. Gill openings wide; membranes not united, free from the isthmus. Mouth large. Teeth rather long, unequal, upper passing outside of the lower jaw, anterior canines fixed, hinder teeth depressible. Palatine and lingual teeth present. Maxillary denticulate. Eye lateral. A hyoid barbel. A suborbital luminous organ. Dorsal near the caudal, opposed to the anal. Caudal forked, separate from dorsal and anal. Ventrals small, widely separated, near the middle of the length. Pectorals of one ray, filamentary, low on the side. No pseudobranchiæ; no cæca.

Dactylostomias filifer sp. n.

Plate LVI. fig. 6.

D. 13 (12–14); A. 15 (14–16); V. 5; P. 1.

Moderately elongate, deeper than wide, depth three fourths of the length of the head, and about one eleventh of the entire length. Head narrow, short, nearly one eighth of the total, rather sharp at the snout, convex across the crown and slightly so from the snout backward. Snout medium, one and one third times as long as the eye, equal in length to the width of the interorbital space, subconical, blunt. Eye of moderate size, three fourths as long as the snout. Barbel very slender, about twice as long as the head, with a small bulb at the end. Mouth wide; jaws almost equal to the head length. Teeth slender and sharp; six to eight on each intermaxillary, of which the first is fixed, the second largest and with the others depressible, passing outside of the lower jaws; first and third teeth on each lower jaw fixed, on the outer aspect of the bone, and passing outside of the upper jaw, second tooth largest and with the fourth to the eighth depressible; small immovable teeth, denticulations, appear on the maxillary and opposed to them on the hinder part of the lower series; a pair of strong hooked teeth on the forward part of the tongue and behind these a short distance a second pair; a short series of small teeth on each palatine. Gill membranes not united, free from the isthmus. No pseudobranchiæ. A rather large luminous organ near the maxillary immediately behind a vertical from the posterior border of the orbit. No other light organs were detected on the specimens. Skin glandular, thickly beset with small papillæ. No pyloric appendages. A female of three and one half inches is filled with mature eggs.

Dorsal and anal near the caudal, from which they are separated as in species of Stomias; dorsal origin slightly forward of the anal, base of anal extending a little farther back than that of dorsal. Ventrals widely separated, little forward of the middle of the entire length, as long as the head. Pectoral a single ray, slender, filamentary, inserted low on the side.

Intense black; mouth and stomach black; fins lighter; small white dots scattered over the flanks and beneath.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 6′ W.	1360 fathoms	36° F.	Glob. Oz. dk. Sp.
3414	10° 14′ N.	96° 28′ W.	2232 "	35.8° F.	Gn. M.
3418	16° 33′ N.	99° 52′ 30″ W.	660 "	39° F.	Br. S. bk. Sp.

IDIACANTHIDÆ.

Idiacanthus antrostomus.

Idiacanthus antrostomus Gilb., 1890, P. U. S. Mus., XIII, 54.

Br. r. 12; D. 55–57; A. 33–34; V. 6; Vert. ca. 79.

Very long and slender, serpentiform, tapering comparatively little backward, moderately compressed, narrow in the caudal region for about one third of the total length. Head short, hardly more than one twelfth of the total length, little more than half as wide as deep. Snout medium, broad, blunt, nearly twice the length of the eye, with a sharp spine-like angle on the top; chin protruding, with a prominent symphyseal angle. Mouth very large, lower jaw as long as the head, angular with a sharp corner. Teeth raptorial, slender, somewhat compressed in the basal half, very sharp, depressible, varying in size, in single series, arranged in groups of three to five the anterior of each being small and the others increasing in size regularly to the hinder which in the middle of the jaw is as long as the eye, small at the symphyses, eighteen to twenty-one on each jaw; a pair consisting of a medium sized tooth and a small one at each side of the vomer and on each palatine; a similar pair at each side of the tip of the tongue and behind these at a short distance another pair at each side. Eye medium, half as long as the snout, one seventh of the length of the head, its centre on a vertical at the end of the anterior third of the maxillary. Nostrils near the top of the snout, midway from the eye to the end of the snout. Four gills, a slit behind the fourth; gill openings very wide, extending from the upper angle of the operculum down and forward to below the eye. Twelve short branchiostegal rays. Barbel one length of the eye from the end of the chin, twice as long as the head; outer fourth of the length expanded into a leaf-like organ with a long point at each end, a fleshy and rather thick median portion and a thin transparent border. A light organ closely resembling the eye in external appearance, of half the ocular length, lies above the middle of the upper jaw close behind a vertical from the hind border of the orbit; a series of twelve similar very small organs is situated at the bases of the branchiostegal rays; at each side of the isthmus there is a row of ten of these organs; between the isthmus and the ventrals at each side of the median line of the belly there is a series of thirty-five and a little above them on each flank a parallel series; the four series continue backward and between ventrals and anal have twenty organs each, while along the side of the base of the anal there are about thirty-five more. Below the large organ on the cheek on the upper jaw there is a yellow glandular streak as long as the orbit; similar patches of glandular structures form three longitudinal series of blotches along the flanks, the lower of which lie between the light organs; posteriorly along the bases of dorsal and anal this structure becomes more or less continuous. A prominent anal papilla. Vent below the twenty-seventh ray of the dorsal.

Dorsal and anal separated from the short rays of the caudal by less than the orbital length; from the snout to the first ray of the dorsal nearly four and to the same ray of the anal more than eight lengths of the head; anal fin entirely within the hindmost third of the entire length; fin rays anteriorly partly free, short, slender, spinous, unsegmented, but near the caudal becoming stouter, longer, more than twice as long as the eye, and segmented. At each side of the base of each ray the interneurals and interhæmals bear a short rigid spine directed out in such a way that the two series, on the opposite sides of the fin, form a trough or cradle in which the rays lie and are protected when folded back. In the description of *Idiacanthus ferox* it is said "Each ray starts behind a minute curved spine-like projection of the vertebra." The structure thus described would interfere seriously in folding back the rays. Since the rays are articulated to the bones bearing the spines in question they would according to the statement quoted articulate directly with the vertebræ. Instead of this, however, it is probable the structure in *I. ferox* is like that in *I. antrostomus* and has the same functions. Ventrals small, narrow, as long as the cleft of the mouth, below the fifth dorsal ray. Caudal narrow, deeply forked, with ten short rays above and eight below.

Black, with glandular patches appearing like transverse or longitudinal series of grayish blotches; caudal yellow; inflated portion of the barbel light.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3375	2° 34′ N.	82° 29′ W.	1201 fathoms	36.6° F.	Gy. glob. Oz.
3383	7° 21′ N.	79° 2′ W.	1832 "	36° F.	Gn. glob. Oz.

SALMOIDS.

Very few deep sea species belonging to this group are known, and none of them occur in the material of the present report. Argentina, Microstoma, Pterothrissus, and Bathylagus are given places in the lists of deep sea genera by different authors; but most of the species are ordinarily taken near the surface and it is only those of Bathylagus which are marked bathybial with any degree of confidence, they being least likely to have entered the net near the surface. Of the haul in which the first discovered species of this genus was secured Mr. Murray says the dredge was in the water seven hours and did not appear to touch the bottom, yet it brought up the fish, shrimps, medusæ, and other animals, most of which, as he thinks, were taken "in the intermediate water between a depth of 100 fathoms from the surface and a short distance from the bottom" (Narr. Chall. Exp., I, 903). Bathylagus is the genus of most interest at this time because of its distribution. Though, like the others of the group, it cannot positively be called a fish of the bottom, the probabilities are that it lives at the greater distances below the surface. One of the species was obtained by the "Challenger" in the south Atlantic at a station for which the given depth is 2040 fathoms, and another was brought by the same vessel from the Antarctic, taken in a depth of 1950 fathoms; two species were caught by the "Albatross" off the eastern coasts of the United States in depths ranging from 600 to 1769 fathoms; and two others, also obtained by the "Albatross," have been described from the northwestern coasts of the United States, the stations being of various depths between 322 and 877 fathoms.

ALEPOCEPHALOIDS.

This group contains the family *Alepocephalidæ* and several types, Rondeletia, Anomalopterus and Cetomimus, of questionable relationships to the family and to one another, probably representing different families, but placed here until more is known about them. Approximately the ascertained horizontal distribution of the Alepocephalidæ extends in the Atlantic, including the Mediterranean, from ten degrees of south to fifty degrees of north latitude, in the Pacific from the equator northward forty-eight degrees, and in the Indian Ocean from Australia northward. The least depth that has been reported for any of the species is 200 fathoms and the greatest is 2949. The greatest range for an individual species is that of *Alepocephalus rostratus* Risso, off the north African coasts, from data secured by expeditions sent out by the French government; this species was taken at various stations between a depth of 453 fathoms and one of 1998, a vertical range of 1545 fathoms. Between Japan and Australia the "Challenger" researches gave the family a range extending from a depth of 345 to one of 2150 fathoms; and in the northern portions of the Indian Ocean the "Investigator" secured specimens at various depths, from 240 down to 1000 fathoms.

There is less uncertainty regarding the habitat of this family than in respect to that of some of the others. Structure, blackness of integument, food, and the condition of the specimens on arrival at the surface all favor the conclusion that these fishes dwell close to the bottom, hundreds of fathoms below the surface. The large eye is a distinguishing feature of the Alepocephalidæ and its possession must be regarded as proof of the presence of light either in the bodies of the other inhabitants of the sea bottom, fellows, enemies, prey, etc., or in the medium in which the family lives, one or the other or both. In the absence of luminous organs, except, it may be, in Xenodermichthys, the principal dependence for recognition of others of the same species at a distance, probably lies in ability to recognize similarities and differences in form, outlines, positions of fins, and the like, and these are made visible by the luminosity of the integuments of the object or by the light in the water around it, presumptively by both of them. The surfaces of these fishes are more or less phosphorescent, but aside from this it would appear that the large eye, with the lack of special light organs and of special developments of the organs of touch, should be taken as evidence that the Alepocephalidæ, and similar fishes, dwell in water that is lighted, perhaps by chemical changes taking place in the ooze on the ocean floor, changes that may at once cause the phosphorescence, retard the waste of tissues, and possibly add something to the supply of oxygen.

Of the Alepocephalidæ, properly so called, a single species was known previous to 1877. The collections of the British steamer "Challenger" discovered six new species, representing among them three new genera. Various expeditions of the United States Coast Survey and the U. S. Fish Commission brought to light nine other species. The work of the Indian government steamer "Investigator" secured eight more, including a representative of a new genus. The French steamers "Travailleur" and "Talisman" found six new ones, one of them representing a genus previously unknown. And the present collection by the "Albatross" contains eight species as yet undescribed, one of them adding a new genus to what are already on the lists, another representing a very distinct species of the genus Narcetes discovered by the "Investigator" off the Goa coast.

ALEPOCEPHALIDÆ.

Leptochilichthys gen. n.

Body elongate, compressed, well rounded above and below, covered with scales; body cavity long; head long, rather broad, deeper than wide, scaleless. Mouth wide; maxillary and intermaxillary both expanded, deep, thin, sharp on their lower edges. Teeth small, in single series, on mandibles, palatines and vomer. Gills four; lamellæ short; gill rakers numerous. leathery; gill membranes not united, free from the isthmus. Pseudobranchiæ present. Branchiostegal rays numerous. Eyes large, lateral. Dorsal and anal behind the middle of the total length. No adipose fin. Pectorals small, situated low on the side. Ventrals small, forward of the dorsal, Caudal deep, forked. Scales cycloid, smaller on the lateral line. Lateral line very distinct. Pyloric cæca few.

This genus is readily separated from Bathytroctes, which it resembles in position of fins, grooved skull, and other features, by the expanded and toothless intermaxillary, and the number of branchiostegals. The expansion to be noticed in the hinder half of the maxillaries of Alepocephalus is in the present genus continued forward on both maxillary and intermaxillary. It appears much as if the slight expansions, on the intermaxillary, figured on Plate LXVIII. fig. 2^a, of *Bathytroctes alvifrons*, obtaining also on *B. rostratus* and others, were in Leptochilichthys carried to a much greater development and turned downward to form the cutting edges. Superficially the upper jaws bear some resemblance to those of some Clupeoids, but the affinities of greatest importance connect the genus with the Alepocephalidæ. Differing so much from all the members of the family it might be well to set it apart in a separate division, characterized by the expanded and toothless intermaxillaries and maxillaries, the thirteen branchiostegal rays, etc.

Leptochilichthys Agassizii sp. n.

Plate LVIII. fig. 3.

Br. r. 13 ; D. 14 ; A. 13 ; V. 10 ; P. 11 ; Ll. 57 ; Ltr. 6 + 1 + 8.

Upper and lower outlines of the body, without the fins, somewhat similar and regular in their curves; depth more than one sixth of the total length. Head about one third of the entire length, twice as long and three fifths as wide as deep, widest at the occiput, cheeks somewhat concave, crown with a deep and wide longitudinal groove between strong ridges from occiput to nostrils. Snout longer than the eye, deep, blunt, thick, rounded, upper and lower outlines much alike in curvature. Eye large, lateral, one sixth of the length of the head, two thirds as long as the snout, as wide as the interorbital space. Mouth very wide, more than half the head length; maxillary long, extending backward one orbital diameter farther back than the orbit, compressed and bladelike nearly its entire length, rounded and bearing a small angular extremity backward, with a moderate supramaxillary bone upon the hinder portion, with a longitudinal keel along the outside; intermaxillary short, less than half as long as the maxillary, like the latter bladelike and sharp edged at the mouth. Both maxillary and intermaxillary are broadened like the posterior section of the maxillary of Alepocephalus. These broad blades extend downward outside of the mandibles and give the mouth a swollen appearance. Protuberance below the angular moderately developed. Teeth very small, in single series on dentaries and palatines, in a series of about five stronger ones on each side of the vomer. Upper jaws apparently toothless. Gill openings very wide; membranes not united, free from the isthmus; laminæ short, narrow; gill rakers 8 + 19, broad, thin, leathery, rounded to a point, with a row of small tooth-like papillæ along each side. Pseudobranchiæ present. Opercles broad, thin, membranous at the margins. Skull bones rather thin and fragile. About eight pyloric cæca.

Base of the dorsal nearly twice its length from the bases of the median rays of the caudal; origin behind the middle of the body, little more than half the length of the head behind the operculum. Anal origin below the hinder extremity of the base of the dorsal. Caudal pedicel deep; caudal fin forked. Pectorals small, below the posterior margin of the operculum. Ventrals small, forward of the origin of the dorsal. Vent below the tenth ray of the dorsal fin.

Scales cycloid, broad, thin, with prominent concentric striæ; those of the lateral line much narrower than those at either side of it and forming but elongate covers for the tubes extended between. Lateral line carried well out toward the end of the caudal.

Entire length about twelve inches.

Black on body, head, fins, and linings.

This is one of the most interesting types in the collection. It is because of his particular interest in these fishes that the species is introduced in the Professor's name.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3398	1° 7′ N.	80° 21′ W.	1573 fathoms	36° F.	Gn. Oz.

Bathytroctes alvifrons sp. n.

Plate LVIII. fig. 2, 2 a.

Br. r. 7; D. 13 (to 14); A. 12 (to 11); V. 7; P. 11; Ll. 44; Ltr. 4 + 1 + 5.

Form moderately slender, pointed anteriorly, compressed, depth one half of the length of the head. Head rather sharp forward, broad on the occipital region, narrowing downward, length about one third of the distance from the snout to the base of the caudal; crown with a wide deep trough-like groove from nape to nostrils between ridges that are nearly parallel throughout. Snout as long as the eye, blunt, swollen around the mouth, narrow above the nostrils, concave from the nostrils to below the eye, slightly convex from snout to forehead. Eye large, three tenths of the length of the head, twice the width of the interorbital space. Mouth wide; maxillary extending below the anterior two thirds of the eye, tooth-bearing, broad posteriorly and rounded at the end, forming nearly two thirds of the upper margin of the mouth; intermaxillary expanded forward in a scalloped edge. Teeth small, slender, in single series on intermaxillaries, maxillaries, dentaries, and palatines; one to several at each side of the vomer; palatine series of four or five; intermaxillary, palatine and vomerine larger. A moderate postorbital angle from which a ridge extends to that at the opercular hinge. Opercles thin and membranous in greater part. Gills four; lamellæ short, narrow; rakers slender, sharp pointed, less than half as long as the eye; openings very wide; membranes not united, free from the isthmus; pseudobranchiæ small though well developed.

Dorsal origin two lengths of the head from the end of the snout, above the hinder portion of the base of the ventral; base hardly reaching to a vertical from the middle of the anal. Anal origin below the eighth or the ninth ray of the dorsal. Vent below the fourth dorsal ray. Depth of the caudal pedicel about half of the depth of the body; caudal fin deeply notched.

Scales, large, thin, deciduous, somewhat narrower in the lateral line.

Black outside and on the linings of the body cavities.

Total length of the described specimen nearly nine inches.

A larger eye, shorter snout, shorter maxillary, broader occiput, and a shallower trough are prominent distinguishing features when this species is compared with *B. alveatus.*

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Gn. M.
3413	2° 34′ N.	92° 6′ W.	1360 "	36° F.	Glob. Oz. dk. Sp.

Bathytroctes alveatus sp. n.

Plate LVIII. fig. 1.

Br. r. 7; D. 15–16; A. 11; V. 10; P. 11; Ll. 70; Ltr. 7 + 1 + 14.

Form bearing some resemblance to that of *Narcetes erimelas* Alc.; depth equal to half of the length of the head. Head long, pointed in front, one third of the length to the base of the caudal, with a deep longitudinal trough on the top between two strong ridges which converge in front of the eye, fading between the nostrils, and which slightly converge toward the nape. Snout elongate, one and one half times the eye in length, rounded at the end as seen from above, acute as seen from the side, concave on the sides from the eye to the nostrils. Eye of moderate size, two thirds of the length of the snout, one fifth as long as the head, as wide as the interorbital space. Mouth wide; maxillary extending little if any farther backward than the hind border of the orbit, more than half as long as the head, very broad toward the end, forming about three fifths of the upper border of the mouth, rounded on the hind margin; intermaxillary with edge directed out and forward. Teeth small but rather strong, subconical, hooked, uniserial, on premaxillæ, maxillæ, dentaries, and palatines; one to three fang-like teeth at each side of the vomer. Symphyseal angle and that below the angular not very prominent; angle at the opercular hinge more prominent than that behind the orbit; angles in front of the eyes, or those forward of the nostrils low. Gills four; lamellæ short, narrow; rakers five plus sixteen, slender, sharp pointed, longest three fourths as long as the eye; membranes not united, free from the isthmus; openings very wide; pseudobranchiæ small. Opercles membranous and thin toward the margins.

Dorsal origin distant from the end of the snout one and two thirds times the length of the head, above the middle of the base of the ventral. Anal origin below the hind end of the base of the dorsal. Vent little backward of a vertical from the middle of the dorsal's base. Ventrals moderate, reaching the anal. Pectorals small, low on the side of the body, reaching halfway to the ventrals. Caudal pedicel rather slender; caudal fin deeply notched.

Surface and interior linings black.

The specimen described has a length of seven and one half inches.

This species is readily separated from *B. alvifrons* by a smaller eye, a longer snout, a wider and longer maxillary, and by the fins and the scales.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3376	3° 9′ N.	82° 8′ W.	1132 fathoms	36.3° F.	Gy. glob. Oz.
3400	0° 36′ S.	86° 46′ W.	1322 "	36° F.	Lt. gy. glob. Oz.

Bathytroctes inspector sp. n.

Plate M, fig. 1.

Br. r. 7; D. 15; A. 11; V. 8; P. 11; Ll. 46 (to 48); Ltr. 5 + 1 + 6.

Moderately compressed in body and head, depth nearly one fifth of the entire length, taper toward the caudal not rapid and not large in amount. Head about one third of the total length, four fifths as wide as deep at the occiput, moderately arched from the snout to the interorbital space, convex on the crown; skull narrow between the eyes and between the nostrils. Snout short, blunt, half as long as the eye, concave in front of the eye on the side, slightly swollen around the mouth. Mouth of medium width, cleft to a vertical from the middle of the eye, rising forward; maxillary tooth-bearing, widening backward, rounded on the hind margin, with a low ridge along the outside, forming about five sevenths of the mouth border; intermaxillary short, two fifths as long as the maxillary spreading out and forward. Teeth small, subconical, in single series on intermaxillaries, maxillaries, and dentaries; a single larger tooth, like a small fang, at each side of the vomer. Eye very large, lateral, twice as long as the snout, five times as wide as the interorbital space on the skull, two fifths as long as the head. A sharp ridge from the angular up and forward to below the eye on the mandibles. Corner below the angular prominent. Four gills; lamellæ short, narrow; rakers five plus fifteen, slender, longest two fifths as long as the eye; openings very wide; membranes not united, free from the isthmus. Opercles large, thin and membranous backward. Pseudobranchiæ well developed. The narrow groove on the skull between the eyes widens into a rounded concavity backward; forward at each side of it there is a shorter groove. Eight moderately long pyloric cæca.

Dorsal origin twice the length of the head from the end of the snout. Anal origin below the twelfth or thirteenth ray of the dorsal. Ventral bases very little forward of a vertical from the first ray of the dorsal; fins reaching behind the vent. Vent below the middle of the dorsal base. Depth of the base of the caudal about half of that of the body; fin forked. Pectorals small, below the middle of the side.

Scales large, broad, thin, flexible, deciduous; those of the lateral line half as broad as those in the series at either side of it.

A female ten inches in length contains mature eggs one eighth of an inch in diameter.

Intense black outside and on the linings of the entire body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3361	6° 10′ N.	83° 6′ W.	1471 fathoms	36.6° F.	Gn. Oz.

Narcetes pluriserialis sp. n.

Plate LVII. fig. 3.

Br. r. 8; D. 19; A. 14; V. 8; P. 11; Ll. 105; Ltr. 9 + 1 + 13.

Resembling *Narcetes erimelas* Alc. to a considerable extent in form but more elongate, possessed of more branchiostegal rays, of pluriserial teeth throughout the jaws, and of a dorsal extending back above the anal. Moderately compressed, very long, tapering comparatively little, depth about one seventh of the total, body cavity occupying two thirds or more of the total length. Head scaleless, long, about one fourth of the entire length, subpyramidal, four fifths as wide as deep, crown very slightly convex, with a median trough on the top that vanishes near the nostrils and is deepest near the nape. Snout large, less than one third as long as the head, nearly as broad as long, pointed, upper outline descending little from the level of the crown; chin rather steep. Nostrils close together, nearer the eye than the end of the snout; posterior more than twice as large as the anterior, oblique, narrow, elongate; anterior small, subcircular. Eyes lateral, large, more than half as long as the snout, nearly one sixth as long as the head, three fifths as wide as the interorbital space. Mouth very large, oblique, cleft more than half the length of the head, extending farther back than the eye; maxillaries forming two thirds of the edge in the upper jaws, posteriorly three fourths as broad as the eye, thin and rounded up and forward at the end; premaxillary short, half as long as the maxillary, extended out or forward at the edges; mandibles strong and deep backward, rising and tapering rapidly forward. Teeth small, subconical, hooked, incurved, unequal, in bands of several series on premaxillæ, maxillæ, dentaries, and palatines; outer series smallest, inner much the largest and depressible; a single large tooth at each side of the vomer. Hyoid with a prominent angle above the end and apparently without teeth. Opercular flap membranous, longer toward the base of the pectoral. Gills four; lamellæ short, narrow; membranes not united, free from the isthmus; rakers slender, three plus thirteen on the forward edge of the first arch, longest less than half as long as the eye; pseudobranchiæ well developed.

Dorsal origin ten seventeenths of the distance from the snout to the end of the caudal; length of base about equal to its distance from the caudal or to two fifths of the distance from the occiput, nearly half as long as the head. Anal origin below the eighth ray of the dorsal, five or six of the rays backward of the dorsal base. Ventrals small, inserted near the middle of the entire length. Vent distant from the origin of the ventrals half the length of the head. Pectorals small, low on the side. Caudal deeply notched.

Scales of medium size, thin, deciduous; those of the lateral line large, convex or raised on the tube, which forms a rounded notch in the hinder margin of each scale.

The specimen from which the description is taken had a length of nearly or quite seventeen inches.

Deep black over the entire surface and on the linings of the body cavity.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3365	5° 31′ N.	86° 31′ W.	1010 fathoms	37°F.	Yl. glob. Oz.

Alepocephalus asperifrons sp. n.

Plate LIX. fig. 1.

Br. r. 6; D. 16–17; A. 17–19; V. 7; P. 11; Ll. 56–58; Ltr. 8 + 1 + 16 ca.

Compressed, depth nearly one fifth of the entire length, caudal region of moderate slenderness. Head about one third of the total length, broad at the back, narrowing toward the throat, broadly curved from the occiput to the end of the snout, with a concave depression or trough from the nape to the internarial region; crown dish-like on the parietal region, with a short ridge putting forward from the occipital crest. The frontal ridges are continuous and converge to a point above the vomer on the snout, where they turn abruptly outward; posteriorly they appear to consist of single rows of rough more or less confluent tubercles, giving the edges of the ridges a very rough or serrated profile; these rough crests extend forward between the orbits. Snout moderate, somewhat concave on the sides forward of the eyes, wider about the mouth, narrow between the nostrils, as long as the eye, blunt. Mouth wide; maxillæ broadening and rounded posteriorly, reaching little backward of the middle of the eye, toothless. Teeth small, slender, acicular, in single series, on intermaxillaries, palatines, and dentaries. Gill covers thin and membranous at the margins, extending back on the bases of the pectorals. Gill membranes not united, free from the isthmus. Pseudobranchiæ well developed.

Dorsal origin two lengths of the head from the end of the snout; dorsal base shorter than its distance from the median caudal rays. Anal origin below the third or the fourth ray of the dorsal; anal base extending backward of the base of the dorsal one or two rays. Vent little behind the first dorsal ray.

Entire length about twelve inches.

Surface and internal linings deep black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3357	6° 35′ N.	81° 44′ W.	782 fathoms	38.5° F.	Gn. S.
3393	7° 15′ N.	79° 36′ W.	1020 “	36.8° F.	Gn. M.

The formulæ given below will serve to indicate the closeness of the relationships of the seven species belonging to the genus Alepocephalus known from off the North American coasts.

A. asperifrons	B. 6, D. 17, A. 19, V. 7, P. 11,	Scales 8–56 to 58–16.
A. Bairdii	B. 6, D. 22, A. 25, V. 10, P. 12,	“ 7–65–11.
A. productus	D. 17, A. 17,	“ 9–67–12.
A. Agassizii	D. 15, A. 17, V. 6, P. 11,	“ 10–90–11.
A. fundulus	B. 7, D. 16, A. 17, V. 6, P. 11,	“ 10–90–18.
A. convexifrons	B. 6, D. 18, A. 19, V. 7, P. 11,	“ 12–90–17.
A. tenebrosus	D. 17, A. 17, P. 10,	“ 16–90–16.

Alepocephalus convexifrons sp. n.

Plate LIX. fig. 2.

Br. r. 6; D. 18; A. 19; V. 7; P. 11; Ll. 90, ca.; Ltr. 12 + 1 + 17.

A stouter and less elongate form than *A. fundulus*, more slender in the caudal region, more curved on the top of the head, and with much less depression at the back of the crown. Head about two sevenths of the entire length, without a longitudinal groove on the top, profile convex from snout to nape. Snout medium, little longer than the eye, narrow between the nostrils, concave in front of the eye, broadened about the mouth, blunted at the end. Mouth wide; maxillary much broadened and rounded posteriorly reaching almost or quite to a vertical through the middle of the eye. Teeth small, in a single series on intermaxillaries, palatines, and dentaries. Vomerine teeth undetermined. Gills four; lamellæ short, narrow; rakers seven plus fifteen, longest less than half as long as the eye. Pseudobranchiæ well developed. Opercles broad, thin, membranous toward the margins. Gill openings wide; membranes not united, free from the isthmus. Twelve pyloric cæca.

Dorsal origin two and one fourth lengths of the head from the end of the snout, above the vent; length of base three fourths of its distance from the median rays of the caudal. Anal origin below the third or the fourth ray of the dorsal; base reaching six or seven rays backward of that of the dorsal. Caudal pedicel moderately slender.

Total length of the largest specimen twelve inches.

Deep black over the surface and on the linings of the interior.

Further differences between this form and *A. fundulus* are seen in the shorter head, shorter snout, obsolescent ridges along the top of the head, smaller number of branchiostegal rays, and larger number of ventral rays.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.

Alepocephalus fundulus sp. n.

Plate LVII. fig. 2.

Br. r. 7; D. 16–17; A. 17; V. 6; P. 11; Ll. 90; Ltr. 10 + 1 + 18.

Elongate and compressed in body and head, greatest depth one half the length of the latter. Head length one third of the distance from the snout to the base of the caudal, width seven tenths of the depth; lower profile nearly horizontal, upper in a very low arch above the orbits; crown of moderate width, somewhat concave transversely. Snout one and one third times as long as the eye, narrow between the nostrils, concave from the eye forward, broadened at the mouth, blunt at the end, with a sharp projection below the mandibular symphysis. Eye large, one and one half times the interorbital space, shorter than the snout, nearly one fourth as long as the head. Mouth large, rising but little forward, cleft to the suborbital region; maxillary broadened and rounded posteriorly, sharp edged and toothless below, edging nearly half of the mouth, extending below the anterior third of the eye; edges of premaxillæ turned downward. Teeth small, subconical, on premaxillæ, palatines, and dentaries; absent from maxillæ, vomer and hyoid. Opercles broad, thin, membranous toward the edges, longer below the middle. Gills four; lamellæ short, narrow; membranes not united, free from the isthmus; openings very wide; rakers seven plus fourteen, broad, thin, less than half as long as the eye. Pseudobranchiæ well developed. Pyloric cæca fifteen. Lateral line very distinct.

Scales small, strong, rather firm, slightly roof-shaped, edged with membrane; those of the lateral line narrower. Head scaleless.

Dorsal origin near five eighths of the distance from the snout to the end of the caudal, little backward of a vertical from the vent; base shorter than that of the anal. Vent midway from the bases of the pectorals to the bases of the median caudal rays. Origin of the anal slightly backward of that of the dorsal. The distance from the anal to the origin of the ventrals is nearly equal to the depth of the head, that is a little more than half the length of the head. Pectorals short and broad, not reaching to the bases of the ventrals.

Description taken from a specimen sixteen and one half inches in length.

Entire surface and linings of the body cavities deep black.

Formulæ and size of scales would bring this species close to *A. Agassizii* G. B., but the latter is less elongate, and has a shorter snout and more curvature on the forehead. *A. productus* Gill has a smaller eye, larger scales, and less elongation than the present form. *A. Blanfordi* Alc. is probably a close ally of *A. fundulus;* the former is figured without a lateral line. Distinguished from *A. tenebrosus* Gilb. by the smaller number of scales above the lateral line, by the small scales of the lateral line, by the longer maxillary, by the greater length of the base of the anal as compared with that of the dorsal, and by the greater length of the body in front of the dorsal fin.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3360	6° 17′ N.	82° 5′ W.	1672 fathoms	36.4° F.	Fne. bk. dk. gn. S.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 "	36.4° F.	Hard.

HALOSAUROIDS.

HALOSAURIDÆ.

In the report on the deep sea fishes obtained by the "Challenger" Expedition, published in 1887, this family was treated as if composed of a single genus, Halosaurus; in the latest publication on the collections of the "Investigator," 1896, the treatment is the same. The same arrangement is followed in the present report, excepting that the genus is divided into two subgenera, the first of which, with *H. Owenii* Johns. as the type, is characterized by scales on the crown and forehead and by little or no to moderate enlargement of the scales of the lateral line, and the second, having for types *H. rostratus* Günt., and *H. macrochir* Günt., is distinguished by absence of scales on the top of the head and by much enlarged scales on the lateral line. On alcoholic specimens of the two subgenera there is a difference in the luminous organs which probably appears to some extent on the living individuals; the membranes covering the lanterns are nearly or quite transparent on *H. Owenii* and its allies of the first group, while on the species of the second group they are more opaque. It is likely this difference is due to the more advanced and perfect development of the lanterns accompanied by the greatly differentiated scales on the species of the second division. The type of Halosaurichthys Alc., 1889, was a species belonging to the subgenus Halosaurus; the genus was based on insufficient or incorrectly interpreted characters, and has since, in 1896, been dropped by its founder. In their latest publications Goode and Bean and Collett retain Halosaurichthys and further divide the remainder of Halosaurus into two genera. Goode and Bean name their genera Halosaurus, Aldrovandia, and Halosaurichthys; and Collett names his Halosaurus, Halosauropsis, and Halosaurichthys. Aldrovandia and Halosauropsis differ only in name. Goode and Bean characterize Aldrovandia thus: "Lyopomi, with ventrals normal; no second dorsal fin; vertex scaleless; scales of the lateral line enlarged, provided with photophores. Head with pointed snout and prominent lateral ridges. Anal fin moderate, high; its height one third to one fourth that of dorsal. Type *Halosaurus rostratus* Günther." The others being possessed by all the family, the only features of those mentioned that serve for distinguishing characters among the species are the scales on the crown and the enlarged scales on the lateral line; but the existence of intermediate species with very thin transparent scales on the crown and with scales on the lateral line moderately enlarged reduces the value of these characters in a diagnosis of either genus and makes it difficult to draw the line of generic separation. Collett says of his genus Halosauropsis that it is "Semblable au genre *Halosaurus*, mais les organes lumineux de la tête et de la ligne latérale sont recouverts d'une membrane en forme de sac s'ouvrant en bas. Type: *H. macrochir* Gthr., 1878." Probably the specimens of Halosaurus examined by this author, and with which he compared, had been injured, as the organs of the lateral system are similar in structure throughout the family; the lanterns of *H. Owenii*, and of others of the group in which these organs are less developed, are provided with the very thin, in cases hardly visible, membranous sac-like coverings opening downward. In their development the enlarged scales, which bear the fusiform luminous organs, have become superstructures by spreading over and covering the regular scales in their own series at each side and in the adjoining series backward, thus compelling a decrease in the number of the glandular bodies as the scales increased in size. The species grouped under Aldrovandia, or Halosauropsis, form the second of the subgenera mentioned above, but which of these names should be applied to it is a question to be settled by priority in publication of the works in which they first appear. The "Oceanic Ichthyology" of Goode and Bean, the source of Aldrovandia, was published jointly by the Smithsonian Institution, the U. S. National Muséum, and the Museum of Comparative Zoology. The Smithsonian and the National Museum gave to their portion of the work the date of going to press, 1895, and the Museum of Comparative Zoology gave to its share the date of completion, and distribution, September, 1896. In Collett's book on the fishes secured by the yacht "l'Hirondelle," the origin of Halosauropsis, it is stated that "Ce Fascicule a été publié et le dépôt fait au Gouvernement à Monaco le 1^er^ Juillet 1896." From this it is evident that Halosauropsis will have to be retained as the name of the subgenus while Aldrovandia becomes a synonym.

Species of the Halosauridæ have been taken in the Atlantic including the Mediterranean from the tropics to a latitude of 42° north, and in the Atlantic and the Indian Ocean southward to the parallel of 46° or thereabout. In the western Pacific north of the equator, the "Challenger," and, in the northern extensions of the Indian Ocean, the "Investigator" secured a number of others. In the eastern Pacific two species obtained by the "Albatross," and described below, establish the distribution in the Gulf of Panama and westward to a short distance north of Culpepper Island. The known vertical distribution extends from a depth of one hundred and twenty-eight fathoms to one of two thousand seven hundred and fifty fathoms.

Apparently the fishes of this group live at the bottom. The positions of their lanterns on the lower portions of the head and the body indicates a probable habit of illuminating the mud for a short distance around the individual in its search for prey. There are no special tactile organs, aside from the soft and flexible snout. The eyes are well developed.

Halosaurus attenuatus sp. n.

Plate LX. fig. 1, 1 a.

Br. r. 15; D. 11; V. 8; P. 15.

On the specimen described nine and one half inches, of its total length of sixteen, are behind the vent in the tail. The body is elongate, slender, moderately compressed and becomes very attenuate and filamentary in the caudal region. Greatest depth one sixteenth of the entire length. Head elongate, one eighth of the total length, retaining a considerable width forward but losing in depth. Snout more than half as wide as the head, preoral portion equal to half the length from the eye, broad, rounded and shovel-shaped at the end. Rostral cartilage with three longitudinal ridges below, bearing a series of prominences across the under side of the middle, blunt angled and rather wide at the end. Mouth medium, about twice as wide as long; maxillary extending little below the eye, with a sharp spine on its upper angle at the end. Teeth small, in villiform bands, similar to those of *H. radiatus* but more slender, on jaws, palatines, and pterygoids. Eye medium, length more than twice the width of the interorbital space, more than five and one half times in the length of the head, two and one half times in the length of the snout. Nostrils small, close together, close to the orbit, anterior with a hood-like valve opening forward. Opercles thin, flexible, rather short, the muciparous canals extending farther back and ending in a couple of angles below the base of the pectoral. The opercle itself is dark colored and, apparently, the whitish membranes of the canals are applied to its surface. Gill arches rather short; eleven rakers on the first arch, shorter than the laminæ, tubercular. Gill membranes hardly united, free from the narrow isthmus; gill laminæ short, two fifths as long as the eye. Mucous canals greatly developed along the side of the head and below each lower jaw; that from the snout below the eye to the opercle is met by that from the chin below the pupil, both widening as they pass backward until at the end their width equals the length of the orbit. On the top of the head the development of the mucous system is hardly greater than on the flank. From the upper angle of the gill opening the lateral line system drops into and through the axil, below the base of the pectoral, until low on the flank where it passes backward, traced by an opaque whitish band (the nerve) under a series of scales upon which there is a series of vertical organs, probably light producers, which externally are covered by a thin transparent membrane. The vertical organs resemble those of Lamprogrammus, Plate XXXIV. fig. 5.

Dorsal origin little more than two lengths of the head from the snout; base twice as long as the eye, the same distance backward of the insertions of the ventrals; fin shaped like that of *H. macrochir*, higher than long, rays decreasing rapidly in length from the second backward; first ray shorter than the second, slender. Origin of the anal about three lengths of the dorsal base backward of the latter, longest ray twice the orbital length. Ventrals small, shorter than the snout, united by membrane. Pectorals small, narrow, acuminate, equal the rostrorbital length of the head, distant from the dorsal little more than twice the rostral length. In the tail the filamentary portion is not far from one seventh of the total length.

Scales medium, thin, each concentrically striate in its backward half and in its anterior section marked with longitudinal grooves diverging forward; twelve scales above the lateral line and five below it; those of the line wider but of the same length as the adjacent scales.

Branchiostegal membranes, throat, intestines, and linings of body cavity black; sides of head blackish, except mucous canals and luminous organs, which are light colored; muscular portions light reddish brown, probably more brilliant in life. Air bladder nacreous. Described from an adult female.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 06′ W.	1360 fathoms	36° F.	Glob. Oz. dk. Sp.

Halosaurus radiatus sp. n.

Plate LX. figs. 2, 2a; Plate LXXXIV. figs. 3-6.

Br. r. 21–23; D. 11; V. 9; P. 14.

Body elongate, compressed, rather stout and broad backed near the head, tapering to slender in the caudal region, depth in front of the dorsal fin one eleventh of the total length. Head high at the nape, descending and acuminate forward. Snout moderately produced, preoral about half of the prenarial length, preorbital length twice the length of the orbit, slightly broadened or shovel shaped at the end. Mouth small, inferior, half as long as wide, length near three fifths of that of the eye. Maxillary with a sharp spine, reaching little behind a vertical from the front of the orbit. Teeth very small, subconical, hooked, with a slight swelling in the bend near the point, strong toward the base, in villiform bands on jaws, palatines, and pterygoids. Eye large, hardly more than one sixth of the head, one half as long as the snout, equal to the width of the interorbital space. Nostrils close to the eye, close together; posterior larger, crescent shaped; anterior with a hood-like valve opening forward. Opercles flexible, thin. Branchiostegal rays numerous, varying from twenty-one to twenty-three, very slender. Four gills; laminæ elongate, numerous; rakers short, longest one fourth as long as the eye, five on the front of the upper portion of the first arch and ten to twelve on the lower. Gill openings wide; membranes hardly united, free from the isthmus. No pseudobranchiæ.

Dorsal origin two lengths of the head from the end of the snout; base equal to prenarial length of snout; fin highest in the anterior rays, height equal rostrorbital length in head, anterior ray little shorter. Anal origin three lengths of the base of the dorsal backward of the latter. Vent close to the anal. Ventrals small, as long as the snout, bases little in front of a vertical from the origin of the dorsal, close together, joined by membrane. Pectorals small, three fifths as long as the head, above the middle of the side, acuminate. Caudal section tapering to a thread-like filament. Scales medium, with fine striæ forming a horseshoe-shaped band parallel with the hinder and the lateral edges, and on the anterior portion with longitudinal striæ, divergent forward from the middle of the scale; those of the lateral line no larger than the others. Lateral line descending from the upper angle of the gill opening through the axil to the lower part of the side whence it continues backward through a series of luminous organs. Each scale of the line is transparent and bears a vertically placed organ resembling those of Lamprogrammus, Plate XXXIV. figs. 1, 4, 5, which in turn is covered by a thin transparent membrane. The number of transverse series varies from two hundred and ten to two hundred and twenty-five, and the number of longitudinal from eleven to twelve above the line, and five below it. Mucous channels greatly developed on the side of the head from the snout to the lower edge of the opercle and from the chin back to the same point below each mandible. These lower canals meet the others below the hind border of the orbit, but a junction is made nearer the end of the tubes; the pores open along the lower edges of the tubes. Pyloric appendages ten to twelve, in a comb-like web along the intestine. A specimen of thirteen and one half inches contains well developed eggs.

Brown to blackish, the black generally in puncticulations, lighter to silvery on the sides and below; mucous channels whitish; tip of snout with a black spot; dorsal and pectorals lighter; fin margins black; intestine reddish or yellowish; linings of mouth and gill chamber, isthmus and shoulders around the gill opening black; lining of abdominal chamber silvery to blackish, with puncticulations of black. A common marking on the scales is silver on the middle to the anterior margin, and puncticulate brown to dark brown on the posterior half of each scale.

The branchiostegal rays serve to distinguish this species from any other at present known.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.
3396	7° 32′ N.	78° 36′ 30″ W.	259 "	47.4° F.	Hrd. gy. M. S.
3354	7° 09′ 45″ N.	80° 50′ W.	322 "	46° F.	Gn. M.

NOTACANTHOIDS.

The eleven known species of the Notacanthoids represent three genera, Polyacanthonotus, Notacanthus and Lipogenys. So far as now determined members of the group occur in the Mediterranean and the neighboring parts of the Atlantic, in the northwestern Atlantic, at the south of Japan, at the south of Australia and New Zealand, off the southwestern coasts of South America, in Bering Sea, and, from the material at hand, in the eastern part of the tropical Pacific. None have yet been reported from the Indian Ocean, or from the southern Atlantic. The greatest depths were those for *Polyacanthonotus Challengeri* Vaill., taken by the "Challenger," south of Yedo, Japan, at 1875 and 1625 fathoms, and by the "Albatross," west of the Pribilof Islands in Bering Sea, at 1401 fathoms, the nearest approach to which is a depth of 1209 fathoms measured by the "Talisman" in the Mediterranean Sea. All of the other depths are less than a thousand fathoms. As has already been pointed out by Günther in the case of *Notacanthus sexspinis* some of the species are doubtful additions to the list of deep sea fishes. Others have more of the appearance of such fishes as are commonly believed to live at considerable distances from the surface at the intermediate depths. In the case of a few there is little reason to doubt that they dwell near to or at the bottom.

This collection includes the types of a new species, described and figured below, the nearest allies of which are *Notacanthus analis* from the western Atlantic, *N. Bonapartii* from the Mediterranean and *N. Moseleyi* from the southwestern coast of South America.

NOTACANTHIDÆ.

Notacanthus spinosus sp. n.

Plate L′, fig. 4, 4a, 4b.

Br. r. 12; D. 9 + 1; A. ca. 17 + 106–112; V. 3–4 + 6; P. 14; C. 6.

Form elongate, compressed, thin and slender posteriorly, depth near one tenth of the total length; tail band-like, tapering. Head about one sixth of the entire length, compressed, pointed. Snout medium, acute, one and one fourth times as long as the eye, preoral portion three fourths of the length of the orbit. Eye large, two elevenths of the length of the head, four fifths as long as the snout, equal the width of the interorbital space. Mouth of medium size, below the snout, directed forward and downward; maxillary bifid and bearing a suborbital spine. Teeth small in a single series on jaws and palatines, declinable, compressed and thin edged, acute, about fifty on the upper and fifty-two on the lower jaws. Nostrils close together, in front of the eye and nearer to it than to the end of the snout, similar to those of Halosaurus, posterior larger, anterior with a hood-like valve open forward. Operculum broad, thin, flexible, supported by twenty-one or twenty-two rays similar to the branchiostegal. On the suboperculum there are five or six additional rays. Twelve to thirteen branchiostegal rays. Gill openings wide; membranes united below, but free from the very narrow isthmus. Gill rakers short, 3 + 9 on the front of the first arch. Gills four, six rakers in the slit behind the fourth; laminæ well developed. A broad glandular mass above the gills inside the upper angle of the opercle below the forward end of the lateral line; apparently adventitious since it rests upon the lining membrane of the gill chamber from which it is not hard to scrape away.

Dorsal origin nearly one length of the head backward from the operculum; rays nine or eight erectile spines and a single soft ray behind the hindmost spine. Ventrals small, little more than one third as long as the head; bases ending below or forward of the first spine of the dorsal; fins united by membrane. Most often there are three simple spines and six soft rays to each ventral; in one case there are seven soft rays, and in two others there are four spines, the fourth being furnished with an additional cusp in front. Anal origin below the third dorsal spine; fin with about seventeen spines in most cases, one specimen has twelve, another nineteen. Pectorals small, fourteen-rayed, reaching a vertical from the origin of the ventrals, more than half as long as the head. Caudal most often with six rays; occasionally there are but five, and in one case there are ten. In this last instance shortness of dorsal and anal indicate a mutilation similar to that so frequently met with in the Macruridæ. The bifid maxillary with its spine makes an approach toward the Halosauridæ that demands the addition of this feature to those already mentioned by Alcock, 1889, Ann. Mag. N. H., IV, 455, as suggestive of affinities between Halosaurichthys and Notacanthus, "the dorsally keeled tail with its indurations, the united ventrals, and the loose palatine bones." Scales minute, thin, adherent, cycloid, covering head and body. Lateral line distinct, on the upper half of the flank, about twenty-four scales from the origin of the dorsal, or twice as many from that of the anal, absent on the tail for about one fourth of the total. Five pyloric appendages.

On the largest specimen the color is rusty brownish red, tinted with bluish; blackish on the opercles and on the linings of the mouth and the body cavity. Smaller individuals are light brownish red.

Total length ten inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.
3354	7° 9′ 45″ N.	80° 50′ W.	322 "	46° F.	Gn. M.

MURÆNOIDS.

The families included by this group exhibit a large amount of diversity in form and structure and this is accompanied by a considerable variety in habits. Nearly all of the species live at the bottom. Burrowing in the mud and more or less nocturnal the Murænoids have descended and adapted themselves readily to the conditions of life at great depths and from the consequent plasticity, brought about by reduction of the amount of inorganic materials and of firmness in the structure, thus bringing the adult and the aged in a measure to resemble the young or the embryo of the surface forms in flexibility and presumably in susceptibility to modification, they have become, through conscious and through unconscious efforts to adapt themselves to or to protect themselves from the demands of their changed circumstances, possessed of diversifying tendencies that have produced some of the strangest forms among the fishes. That the fishes of great depths are rather more subject to variation than those near the surface is the conclusion one reaches from a study of bathybial species. The parasitic habit, in living fishes, of some species does not separate them so very widely from others if it is remembered that the habit of burrowing into the dead bodies of other animals is not rare among the eels.

The members of this group inhabit the marine and the fresh waters of the torrid and the temperate regions. There is no doubt whatever that future research will extend the distribution into the polar regions; for being found at all depths, from the surface to 2500 fathoms, and in temperatures as low as 36° F. or even lower, there is no apparent reason for absence of eels wherever other marine fishes occur.

Excepting the areas near the poles, the vertical distribution as now known compares well with that of any of the other groups. The greatest depths known to be inhabited by muraenoids were noted by the "Challenger" for *Labichthys infans* Günt. at 2500 fathoms, and *Nemichthys scolopaceus* Rich. at 2369, in the northwestern Atlantic. In the northeastern Atlantic the "Talisman" reported *Synaphobranchus pinnatus* Gron. from 1749, and *Serrivomer Richardi* Vaill. from 1637 fathoms. The present material collected by the "Albatross" from the eastern tropical Pacific contains a new species of Labichthys, *L. Bowersii*, from 2232 fathoms; and the "Challenger" secured *Histiobranchus bathybius* Günt. at 2050 fathoms in the middle of the north Pacific, also at 1875, south of Yedo, and at 1375, midway between Cape Good Hope and Kerguelen Island. This vessel took *Cyema atrum* Günt. in the South Pacific and the Antarctic at 1500 and at 1800 fathoms. The deepest captures by the "Investigator" in the northern parts of the Indian Ocean were of *Gavialiceps microps* Alc. at 1370 and of *Promyllantor purpureus* Alc. at 1000 fathoms.

In the collection at hand there are sixteen species of the group, thirteen or fourteen of which are first described below. The list includes a species of Uroconger, two species of Congermuræna, one of Congrosoma, three of Ophichthys, one of Xenomystax, one of Chlopsis, two of Venefica, one of Serrivomer, one of Labichthys, one of Nemichthys and two of Echidna. Species of the genera Uroconger, Venefica and Serrivomer have not heretofore been reported from the Pacific. Uroconger was found in Chinese and East Indian waters, and more recently off the coast of Europe and near Havana. The new species of the genus, *U. varidens*, is most closely allied to the species taken off the coast of Cuba, which species, it may be added, is different from that off the northern coasts of Africa to Europe and is entitled to a different name. The Cuban species is figured in the "Oceanic

Ichthyology," Plate XLII. fig. 160, under the name *Uroconger vicinus;* it differs greatly from *U. vicinus* Vaill., in the origin of the dorsal fin, in dentition, and in coloration, and in the present list it is given the name *Uroconger vicinalis.* Venefica and Serrivomer have heretofore been reported, by the U. S. Fish Commission steamers and by those of the French Government, from both sides of the Atlantic in species that are closely related to the new ones taken in the central eastern Pacific.

Besides those mentioned above there are eight or ten of the larval forms known as Leptocephaloids which are grouped together and treated separately.

MURÆNIDÆ.

Uroconger varidens sp. n.

Plate LXI. fig. 1.

Br. r. 14; D. 209; A. 152; P. 19; C. 10; Pores 147 ca.

Compressed and moderately elongate, one eleventh as deep as long, slender in the posterior fifth of the total length. Head medium, three fourteenths of the total, little less than half as long as the distance from the snout to the origin of the anal fin, about as wide as high. Snout moderate, rather thick and heavy, extending but a short distance farther forward than the lower jaws, much less prominent than that of *Congermuræna proriger*, one fifth as long as the head, one and one fourth times as long as the eye, rounded at the end. Eye large, nearly one seventh as long as the head, as wide as the interorbital space, four fifths as long as the snout. Nostrils small; anterior with a short tube, on the forward aspect of the snout; posterior near the upper portion of the eye. Mucous chambers and openings well developed. Lips of medium thickness. Mouth wide, cleft to a vertical from the hind border of the orbit, two sevenths as long as the head. Teeth small, in bands on jaws and vomer, outer larger; one to several larger on the forward end of the shaft of the vomer and a larger one at each side of its head, the group on the head of the vomer separated from those on the shaft by a narrow interspace. The band on the shaft of the vomer is short, narrowly — if at all — separated from the bands on the jaws, and ends some distance forward of a vertical from the posterior nostril. Gill openings half as wide as the orbit, separated from one another by a space of one and one half times their width, extending half way up on the pectoral base.

Dorsal origin above the base of the pectoral; anal origin two lengths of the head behind the end of the snout, below the fifty-first ray of the dorsal. Dorsal and anal moderately deep, continuous with the caudal, which is small, pointed, and about as long as the snout. The caudal pedicel is more tapering and slender than in *Congermuræna proriger* and *C. caudalis.* Pectorals as long as the mouth, moderately broad, rounded on the outer edge. Lateral line distinct, arched in a low curve above the gill chamber, with a larger lower and a median series of minute pores, which number on the specimens examined from one hundred and forty-five to one hundred and forty-nine.

Blackish; fins lighter, dorsal and anal with a narrow border of black, pectoral rather darker in its upper half; linings of mouth to abdomen white or silvery covered with more or less of blackish. Total length twelve and one half inches.

An individual of the length of six and one half inches is much lighter in color, the fins are more narrowly margined with black, the muscular regions are light reddish brown with puncticulations of darker near the bases of the fins; it is whitish on the lower half of the head and on the belly, the lighter color reaching up behind the cheek and on the gill flap to the middle of the side, and the lateral line forms a rather wide stripe of white which narrows backward. The snout is shorter, the eye larger, and the caudal region more slender than in large specimens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3396	7° 32′ N.	78° 36′ 30″ W.	259 fathoms	47.4° F.	Hrd. gy. M. S.
3357	6° 35′ N.	81° 44′ W.	782 “	38.5° F.	Gn. S.

Congermuræna caudalis sp. n.

Br. r. 17; D. 201–207; A. 147–158; P. 15–16; C. 15; Pores 120.

Comparatively elongate, slender, and compressed; caudal region retaining a considerable amount of its thickness and depth toward the end of the column; tapering forward from the shoulders to a sharp point at the end of the snout; depth about one thirteenth of the total length, and length of the body cavity nearly two fifths. Head long, one fifth of the entire length, rather slender and sharp on the snout, tapering from the nape, somewhat flattened or depressed on the crown along the median keel of the skull. Snout long, protruding beyond the mouth more than half the length of the orbit, little wider than deep, slightly rounded across the end, one and one half times as long as the eye. Nostrils medium; anterior forward of the mouth on the lower half of the snout, with a short tube; posterior at a short distance in front of the middle of the eye, with raised edges. Mouth large, cleft extending below little more than half of the eye; lower jaw shorter. Teeth small, in villiform bands of medium width; those on the head of the vomer are forward of the lower jaws and slightly separated from those of the shaft, which latter are stouter, arranged in about four irregular series, separated from those of the jaws, and disappear at a vertical from the posterior nostril. The pores around the mouth and on the snout are of medium size. Eye large, two thirds as long as the snout, one seventh of the length of the head, length greater than the width of the gill openings or less than their distance apart. Interorbital space two thirds of the orbital length. Branchial apertures extending up forward of the lower half of the base of the pectorals. Lateral line distinct, with a series of large pores along its lower edge, and with a series of minute pores near the middle, each pore of which is a trifle backward from one of the large ones.

Vertical fins continuous around the tail. Dorsal better developed than the anal, its origin forward of the pectoral bases about one half of the orbital length. Anal rays short, first below the sixty-second ray of the dorsal. Caudal pedicel muscular and deep, fin rounded on the hind margin. One of the specimens studied has but fifteen caudal rays, which appears to be normal; another has thirty-three rays in the fin, but in this case a space covered by membrane exists between them and the rays of the anal, which fin contains fewer rays than on others. Total length thirteen and one half, snout to anal origin five and one half, head two and seven eighths inches and depth at the shoulders one inch.

Body rusty brown, darkening toward the bases of the fins; fins growing lighter toward their margins; snout and lips lighter; lower and hinder portions of the pectorals broadly margined with whitish; linings of the branchial chamber and of the abdomen black. On other specimens the fins grow darker toward the caudal and the belly and opercular regions are very dark.

Allied to *C. nitens,* but differing slightly in proportions, having a shorter broader pectoral, no black margin on the fins, no spots or dots, no silvery shade, and no lighter color on the belly.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 9′ 45″ N.	80° 50′ W.	322 fathoms	46° F.	Gn. M.

Congermuræna prorigera.

Ophisoma prorigerum Gilb., 1891, P. U. S. Mus., XIV., 350.

Br. r. 17; D. 227; A. 176; P. 19; C. 10; Pores 136.

Body moderately long, compressed, depth twelve times and length of body cavity two and three fifths times in the total length. Head elongate, four fifteenths of the entire length, five ninths of the distance from the snout to the anal origin, somewhat compressed, narrowed and sharpened in front, longitudinally wrinkled on the thorax. Skull with a low median keel. Snout prominent beyond the lower jaw, one fourth as long as the head, one and two thirds times the length of the eye, angled across the end as if for rooting. Anterior nostril below the angle of the snout near the tip, with a short tube; posterior immediately in front of the eye, with prominent margins. Mouth medium, longer than the snout, cleft almost to a vertical from the hind border of the eye. Teeth small, subconical, in bands on jaws and vomer. The transverse group on the head of the vomer is externally exposed and is separated from the band on the shaft by a narrow space. The band on the shaft of the vomer narrows backward and ends below the space between the eye and the posterior nostril; in front it is hardly separated from the bands on the jaws. Eye large, half as long as the snout, one ninth as long as the head, not as wide as the interorbital space. Gill apertures one and one half times the width of the eye, separated by a space of the same width, extending little upward in front of the pectorals. Lateral line distinct, with larger pores along the lower edge and minute ones along the middle, in a low arch above the gill chamber, wider forward, with one hundred and thirty-six pores.

Dorsal and anal continuous with the caudal, moderately deep. Dorsal origin one diameter of the eye farther forward than the gill opening. Anal origin below the fifty-sixth ray of the dorsal. Caudal short; while the fins are really quite continuous about ten of the rays appear to spring from the end of the column to form the narrow fin. Pectorals well developed, of medium depth, equal in length to the distance from the snout to the posterior border of the orbit, broadly rounded on the distal end, reaching when applied to the side of the head less than one third of the distance to the end of the snout or less than half of that to the orbit. A thirteen inch female contains eggs that are about mature.

General color dark olivaceous; fins with black edges that widen backward; lateral line lighter, pores whitish; pectoral fins yellowish toward the outer extremity; linings of the branchial chamber black, those of the mouth and of the abdomen blackish. This coloration differs from that of Gilbert's specimen in having no white margin to dorsal and anal; it may be that the two forms do not belong in the same species.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 fathoms	48.8° F.	Gn. M.

CONGROSOMA gen. n.

Body elongate, compressed, caudal portion much the longer. Head small, shorter than the trunk. Snout short, thick, blunt. Eyes large, lateral; pupil round. Mouth medium, cleft below more than half the eye. Teeth small, subconical, subequal, in broad bands of which those on the upper jaws and the vomerines are not separated in front. Lips well developed. Vertical fins continuous; caudal small; dorsal origin at a distance behind the bases of the pectorals. Lateral system strongly developed on body and head; pores large. Vent far in advance of the mid length.

This is Congermuræna with the head from the eyes forward more shortened, with the upper bands of teeth more closely joined anteriorly, with the dorsal originating farther backward, and with the vent farther forward of the midlength.

Congrosoma Evermanni sp. n.

Plate LXII. fig. 1.

Br. r. 13; D. 324; A. 265; P. 14; C. 10; Pores 130 ca.

Body elongate, slender, compressed; depth one seventeenth of the total length, retained comparatively well toward the caudal. Head subconical, convex on the crown, blunt anteriorly. From the snout to the gill opening is one sixth of the entire length, and from the snout to the vent is three eighths. Snout short, projecting beyond the lower jaw, bluntly rounded, less than one fifth of the length of the head, one and one half times as long as the eye. Anterior nostrils on the lower aspect of the snout, with short tubes, posterior near the eye, subround, with prominent edges. Eye large, in length equal to the width of the interorbital space, two thirds as long as the snout, two thirteenths as long as the head. Lips of moderate thickness.

Mouth wide, cleft to a vertical from the hinder border of the pupil. Teeth small, subconical, subequal, in bands on jaws and vomer; vomerine band narrowing backward and ending at a vertical from the front edge of the eye; the group at the head of the vomer not separated from the band on the shaft or from the bands on the jaws. Gill openings hardly equal to the length of the eye, separated on the chest by a space greater than their width, extending upward over less than half of the pectoral base. Mucous cavities of the head greatly developed; pores larger and elongate on the forward portion of the snout.

Dorsal and anal of medium development, continuous with the caudal. Dorsal origin the length of the mouth backward from the bases of the pectorals. Anal origin distant from the end of the snout two and one third times the length of the head, below the fifty-fourth ray of the dorsal. Caudal short, narrow, pointed. Pectorals short, as long as the mouth, comparatively deep, broadly rounded, reaching when applied to the side of the head one third of the distance to the middle of the eye or one fourth of that to the end of the snout.

Lateral line distinct, somewhat arched above the gills. Vent below the fifty-third ray of the dorsal.

Total length ten and one half inches.

Blackish above the lateral line; dark chocolate brown below, excepting on the lower surface of the head, the lateral line, and the bases of the fins, which are white. Dorsal and anal are yellowish white in their proximal halves, black in the distal portions, and each pectoral has a large blotch of black on the upper and hinder portion of the fin. The linings of the gill chamber are black, of the mouth white, and of the abdomen silvery.

Specific name from that of Prof. B. W. Evermann of the United States Fish Commission.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.

Ophichthys (Cryptopterus) frontalis sp. n.

Br. r. 22; D. 279; A. 177; P. 21; Vertebræ 63 + 94 (63 to end of body cavity, or 53 to vent).

Moderately elongate, slightly compressed, tapering gradually, entire caudal region rather thick. Head somewhat large, one third as long as the body, or one seventh of the entire length; crown broad, in a low arch from nape to internarial region. Snout short, nearly one seventh of the head, equal to the width of the interorbital space, little longer than the eye, not varying greatly from one third of the mouth-cleft, subpyramidal, shovel-shaped at the tip. Nostrils near the edge of the lip; anterior tubular, near the end of the snout; posterior nearer the eye, with a shorter and smaller tube. Teeth small, larger forward, acicular, in two series on each jaw and in a single series along the shaft of the vomer. The anterior upper teeth form an angular transverse series, in front of the lower jaws, that is separated from the other teeth by a notch below the forward nostril. A group of several begins the series on the vomerine shaft. Several of the foremost teeth resemble canines. Lower jaws shorter than the upper. Tongue small. Eye large, three fourths as long as the snout, two sevenths as long as the mouth, nearly one third of the length of the head, situated above the middle of the mouth cleft, pupil horizontally elongate. Gill openings wide, more than twice the width of the base of the pectoral, separated from one another below by a space of less than the width of the opening, nearly vertical but lower angles farther backward.

Dorsal origin over the posterior fourth of the pectoral, distant from the gill openings less than one third of the length of the head; dorsal rays weak, like those of the anal received into a groove at their bases formed of folds of the skin. Anal origin below the eighty-first ray of the dorsal, deeper than the dorsal but like the latter hidden in a groove. Tip of the tail finless for about one length of the orbit. Pectorals medium, two sevenths as long as the head. In cases the fins are very low. Vent below the seventy-seventh and end of body chamber below the ninety-eighth dorsal ray.

Brown, darker on the upper portions; tip of tail, fins, and throat little lighter.

On young specimens the whole body is lighter in color, and the fins are less developed. A female measuring sixteen inches in length contains mature eggs. Largest specimen twenty-two inches long.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 fathoms	48° F.	Fne. gy. S.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 "	48.8 F.	Gn. M.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 "	55.8 F.	Gn. M.

In the subdivisions of the genus this species should be placed in *Cryptopterus* Kaup, near *C. puncticeps* Kaup from the Caribbean Sea, its closest ally.

Ophichthys biserialis sp. n.

Slender and elongate, depth one sixteenth of the entire length, tail one and three fifths times the distance from the snout to the origin of the anal fin, which latter is two and one half times the length of the head. Head subconical, crown slightly convex in all directions. Snout rather narrow, pointed, nearly one fifth as long as the head, projecting beyond the lower jaw about two thirds of the length of the eye, sharp-edged at the sides, flexible at the end. Eye large, two thirds as long as the snout, one eighth of the length of the head; pupil elongate, horizontal. Mouth wide, three sevenths as long as the head, extending one ocular diameter backward ot the orbit. Tongue well developed. Teeth small, subconical, in two series on the jaws and the vomer, longer forward, gradually decreasing in size backward, four or five large ones forward of the lower jaw between the anterior nostrils, vomerine series ending below the forward portion of the eye. Anterior nostrils tubular, pendant above the ends of the lower jaws; posterior concealed by a fold on the lip, near the eye. Gill openings small, not as wide as the eye, separated from one another by a space equal to the length of the orbit.

End of the tail extending beyond the dorsal and anal, by about one orbital length, finless. Dorsal and anal low; dorsal origin one length of the orbit backward from the gill opening, above the middle of the pectoral; anal origin three and three fourths lengths of the head from the end of the snout. Pectorals small, as long as the mouth, pointed. Lateral line distinct.

Light reddish brown, with a series of twenty-six elliptical or ovate spots of brown, larger than the eye, above the lateral line behind the head; head with a dozen or more rounded smaller spots of brown, smaller toward the snout; lower half of the head white; lower half of body plain; fins whitish.

Hab. Chatham Island, Galapagos. Probably not descending far from the surface.

Pisodontophis peninsulæ.

Callechelys peninsulæ Gilb., 1891, P. U. S. Mus., 548.

Elongate, slender, slightly compressed forward, more so on the tail; depth one twenty-fifth, length of the head two twenty-fifths, and length of the body chamber two fifths of the total length. Head small, one fifth as long as the distance from the snout to the origin of the anal fin, little higher than wide, convex on the crown, swollen around the gill chamber. Snout less than one fifth as long as the head, shorter than the mouth, extending forward of the lower jaw one diameter of the eye, curving downward in the outline from the crown. Eye small, nearly one twelfth as long as the head, two fifths of the length of the snout; pupil longer than high. Mouth wide, reaching one diameter of the eye backward of the orbit, longer than the snout. Teeth with rounded crowns, in two more or less regular series on jaws and vomer; anterior group on the upper jaws larger, exposed in front of the chin. Vomerine series longer than the mouth, passing backward of the eye; anteriorly they appear to be in two series, posteriorly there is evidence of an irregular third. About the middle of the length of the mandibulars there are three series. Nostrils small; anterior with a short tube, directed downward immediately in front of the lower jaw; posterior hidden in the lip below the forward part of the eye. Gill openings oblique, width equal to one and one half times that of the orbit, or little more than half of that of the space separating them on the chest.

Dorsal and anal fins low, not united at the tail; no caudal fin. Dorsal origin on a vertical half way from the mouth to the pectoral; anal origin two fifths of the distance from the snout to the end of the tail. Pectorals very short, deeper than long, appearing as a fold along the hinder edge of the gill opening; rays distinctly visible. Lateral line distinct, pores small.

Light rusty brownish; with thirty-three large spots of brown in a series on each side of the back above the lateral line, with a series of smaller spots below the lateral line, alternating with the series above it, and with a more or less incomplete third series below the second at the sides of the base of the anal fin; hinder part of gill chamber yellowish white; belly lighter; dorsal tipped with white and bearing a series of small blotches of brown; head with five or six somewhat irregular transverse series of small spots, smaller forward and below, forming complete circles between the snout and the middle of the gill chamber. While the lateral spots on the body commonly alternate, there are cases in which they coalesce and form bands.

Hab. Panama and northward. Described by Gilbert from La Paz Bay, Gulf of California. This species would better be placed in the subgenus *Pisodontophis* Kaup. It is not a deep sea fish.

Echidna cocosa sp. n.

Form similar to that of *Echidna nebulosa* Ahl. Body moderately compressed; vent near the middle of the entire length; tail retaining its depth until near the extremity, where it tapers rapidly to the bluntly rounded end. Head compressed, much arched above the snout, concave in the outline of the interorbital region, measuring about one eighth of the total length, depth one sixteenth of the entire length and width close upon two thirds as much. Snout higher than wide, strongly arched from the lip to the interorbital space, one and one half times as long as the eye. Eye medium, one ninth as long as the head, two thirds of the length of the snout. Mouth wide, less than one third of the head length, hardly extending backward of the orbit one diameter of the eye. Teeth of divers shapes and sizes. The anterior eighteen or twenty of the upper jaw are larger, swollen at the base and moderately sharp at the apex; about seventeen of them belong to the maxillary series and are arranged in two series at the sides of the jaw, but one in front, those of the outer series being smaller and alternating with those of the inner; the other two of this group are continuous with the vomerines, still larger and depressible, forming a row between the maxillary series. Backward of the large teeth there are smaller maxillary teeth in two series, of five or six teeth each, which continue farther back in a single series of half a dozen teeth. Anteriorly for the greater part of the length in the vomerine series the teeth are crowded together as if in one to three irregular series, not distinct as in *E. nebulosa*, but farther back they form a single row which reaches farther backward than the cleft of the mouth. On the lower jaws in the group at the symphysis there are twelve large teeth or more, of which the median two pairs are larger and resemble canines, behind the large ones; at the sides the teeth are smaller and form single series. Anterior nostril with a short tube; posterior pore-like, above the front edge of the orbit. Gill opening smaller than the eye. Vertebræ 57 + 66, Dorsal rays 136 + 170 ca.; dorsal origin nearly one fourth of the length of the head forward of the gill openings.

In a measure the coloration resembles that of *E. nebulosa;* there are about twenty-eight more or less indefinite and irregular transverse bands of brown separated by narrow spaces of lighter, bands and spaces much broken, blotched, and varied by lighter or darker.

Hab. Cocos Islands.

This species and *E. nebulosa* are closely allied. A specimen of the latter from the Society Islands has nearly the same number of vertebræ, 55 + 71; but has a larger number of dorsal rays, 139 + 209 ca., single rows of maxillary teeth, two series of vomerines — distinct anteriorly, and a somewhat different style of markings.

Echidna scabra sp. n.

This species resembles *Echidna nebulosa* and *E. cocosa* in shape but is stouter, less slender, has a shorter tail, and larger scale marks than the latter. It also resembles *E. nocturna*, but has a longer anal, a different dentition, and a different maculation. Body and tail compressed; depth one thirteenth of the total length, tolerably well retained till near the end of the tail, which is rounded on the hind margin to a blunted extremity; vent midway from the eye to the end of the caudal fin. Head compressed, length about one seventh of the total, or four fifteenths of head and body, very convex in outline above the snout, concave above the orbits. Snout deep, strongly arched, longer than the eye. Mouth large, two sevenths as long as the head, extending little farther backward than the eye. Teeth varying in shapes and sizes: at the head of the vomer at each side there are eight large stout swollen-based teeth, with cusps somewhat blunt, forming a closely set series around a short longitudinal row of three larger ones in the middle; backward of this anterior group there are two series of smaller and sharper teeth on each maxillary, and a series of similar ones on the shaft of the vomer; opposed to the vomerine group, on the lower jaws there is another group of strong teeth like those meeting them from the upper jaws, of about eight on each side separated in the middle by two; behind the symphyseal group, on each dentary the teeth are of moderate size and blunted cusps and form a single row. The two maxillary series of teeth below the orbit on each side do not end in a single series as in *E. cocosa;* they and the vomerines extend backward nearly as far as the hind border of the eye. In the forward groups the teeth increase in size backward in the series. Gill opening smaller than the eye. Eye large, two thirds as long as the snout, one tenth of the length of the head. Anterior nostril tubular, posterior above the forward half of the eye. Vertebræ 57 + 69.

Dorsal origin one length of snout and eye forward of the gill openings; anal fin little more than half as deep as the dorsal, deeper backward.

Skin appearing as if roughened by imbedded scales, much larger than those of *E. cocosa* on which in fact they are hardly perceptible.

Dark brown, with a series of small, white spots, about fifty in number, extending from the head to the end of the tail on each side near the base of the dorsal, and parallel with this series another just above the middle of the flank not continuing so far backward as the first.

Hab. Cocos Islands.

Xenomystax rictus sp. n.

Plate N.

Br. r. 11; D. 265–292; A. 192–214; P. 12, rarely 13.

Elongate and moderately slender, compressed and tapering gradually to a slender extremity behind the body, which is subcylindrical, depth about one eighteenth of the total length. Head long, nearly one fifth of the total, narrow forward, tapering regularly from the occiput, somewhat flattened on the crown, half as long as the distance from snout to anal origin, three eighths as long as the caudal region. Snout rather long, nearly one third as long as the head, four times the length of the eye, extending beyond the lower jaw about three fourths of the ocular length, blunt and soft at the end, which bears a rounded patch of slender subconical teeth on its lower side. Eye one fourth as long as the snout, one eleventh of the length of the head, equal to the width of the interorbital space, little forward of the angle of the mouth, front edge at the posterior fourth of the length of the mouth cleft. Mouth wide, cleft but little backward of a vertical from the hind margin of the orbit; maxillary ending at the mid-length of the head; lower jaws shorter than the upper, a trifle swollen at the ends, where they fit upward into a toothless notch below the anterior nostrils. Teeth small, subconical, in bands which are divided lengthwise on the jaws by a groove, in a single series of four or more stronger hooked teeth on the vomer between the maxillaries, separated below the end of the snout by a wide notch from the anterior group. This vomerine series contains the strongest teeth; these extend only through the forward half of the cleft, and the series is continued by much smaller teeth nearly or quite to the vertical from the forward border of the orbit. At the inner side of the groove on the jaws, and in the vomerine series the teeth are rigid; all the others are depressible. Anterior nostril tubular, projecting above the ends of the lower jaws; posterior subround, with raised border, half way from the eye to the anterior.

Pores of the forward part of the head elongate. Gill openings crescentic, upper angle at the lower edge of the base of the pectoral, twice the width of the space separating them on the chest, width equal two fifths of the length of the snout.

Dorsal more developed than the anal, originating one diameter of the orbit forward of a vertical from the base of the pectoral. Anal narrow, originating about sixty-five rays backward from the dorsal origin. Caudal narrow, pointed, of about seven rays in the present specimen. Pectorals narrow, low on the side, acuminate, occasionally absent, commonly of twelve rays, sometimes of thirteen, in length equal to one half of the distance from the snout to the end of the maxillary, two thirds as long as the snout.

Lateral line distinct, median, continuous; pores on the anterior portions subround, those toward the caudal becoming elongate or confluent into an open groove. Cephalic pores larger, from the postorbital region forward elongate. No scales. An air bladder. Vertebræ 39 + 134. Males smaller; females with caudal region shorter, less than three times head or trunk.

Brown tinged with red; pores, mouth, and edges of dorsal and anal, whitish to reddish; pectorals red with more or less of blackish at their bases. Young lighter in color.

Distinguished from *X. atrarius* Gilb., by the equal length of head and trunk, by longer pectorals, and by the coloration. The proportions are similar to those of *X. trucidans* Alc., but the coloration differs greatly.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.
3394	7° 21′ N.	79° 35′ W.	511 "	41.8° F.	Dk. gn. M.
3354	7° 9′ 45″ N.	80° 50′ W.	322 "	46° F.	Gn. M.
3404	1° 3′ S.	89° 28′ W.	385 "	43.2° F.	R.
3417	16° 32′ N.	99° 48′ W.	493 "	40.6° F.	Gn. M.

NETTASTOMIDÆ.

Chlopsis Gilbertii sp. n.

Plate LXII. fig. 2.

Br. r. 12; D. 370 ca.; A. 283 ca.

Elongate, slender, subcylindrical, tapering to the snout and to the end of the somewhat compressed whip-like and acuminate tail; body cavity one third, length of the head two fifteenths and depth one thirtieth of the total length. Head rather narrow, two fifths as long as the distance from snout to vent. Snout slender, blunt, covered with papillæ, soft at the end, ascending from the mouth forward, length from the tip to the middle of the eye equal to one third of that of the head. Anterior nostril above the premaxillary group of teeth, with a short forward directed tube; posterior covered by a fold of the skin which extends back to the eye giving the nostril the appearance of a long slit below the eye and forward opening in the lip. The nasal sac lies directly in front of the eye. A pair of pores of moderate size on the upper surface about half way between the anterior nostrils and the posterior. Eye large, about two fifths as long as the snout, nearly one ninth of the length of the head. Mouth wide, cleft extending as far backward as the hind edge of the orbit. A narrow notch below the forward nostrils between the anterior and the maxillary teeth. Teeth small, sharp, hooked, in villiform bands on jaws and vomer; anterior group forward of the lower jaws, convex forward, concave on the hinder margin, narrowly separated from the maxillary bands or from the vomerine teeth behind them; the band on the shaft of the vomer narrow forward, widening backward, ending at a short distance forward from the eye below the posterior nostrils. Gill opening small, crescentic, convex forward, vertical diameter nearly that of the eye, below the middle of the side; interspace about one third as wide as the opening. A prominent corner on the angular. Lateral line distinct, above the middle of the flank, approaching the upper surface slightly forward of the dorsal.

Dorsal origin backward of the gill openings one half of the ocular diameter; fin narrow. Anal narrower than the dorsal, first ray below the ninety-second ray of the latter, origin at the beginning of the posterior two thirds of the total length of the specimen. Caudal narrow, acuminate, continuous with dorsal and anal. Pectorals and ventrals absent.

Brownish flesh color, probably reddish in life, with brown puncticulations more or less coarse, little darker on back and head, little lighter on belly, fins lighter.

Distinguished from *C. equatorialis* Gilb. by the origin of the dorsal almost directly above the bases of the pectorals, by the tail twice the length of the body cavity, and by the absence of a blackish streak along the median line of the belly.

Specific name from that of Prof. C. H. Gilbert, who first discovered the genus in American waters.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.

Venefica ocella sp. n.

Plate LXI. fig. 2.

D. 417; A. 324; C. 14.

The slenderest species of the genus so far as known. In the specimen here described, which may not be entire, the distance from the snout to the vent is nearly one third of the total length, while the depth is but one fifty-sixth. The head is close upon one ninth of the entire length, very slender, and rather wider than deep, especially on the snout. Snout acute, very long, three fifths as long as the head, or from the eye to the tip excluding the proboscis equal to one half of the cephalic length. Proboscis more than three fifths as long as the balance of the snout, slender, pointed, subround in transsection, slightly enlarged near the end, situated about one length of the orbit in advance of the swollen ends of the mandibles. Anterior nostrils tubular, on the superolateral surface of the widened extremity of the rostrum, directed forward and upward; posterior small, longer than wide, in front of the upper part of the eye and one orbital diameter farther forward. Mouth wide, maxillary situated backward of the eye about one length of the orbit. Teeth in bands, on jaws and vomer, small, subtriangular and somewhat depressed in the cusp, which latter is sharp on edge and apex and hooks back toward the gullet. Below the cusp on many of the teeth there is when seen from front or back constriction enough to give the outline the shape of an arrowhead. Behind the anterior group, and separating it from the other vomerines, there is a space in the shape of a horseshoe from which a notch extends outward at each side separating the group from the maxillary bands. Eye small, one thirteenth of the length of the entire snout, or one twenty-first of that of the entire head. Gill openings small, their width and distance apart about equal to the length of the orbit.

Dorsal origin above the gill opening, fin on the specimen described with four hundred and seventeen rays. Anal origin below the ninety-ninth ray of the dorsal, fin with three hundred and twenty-four rays. Caudal narrow, two fifths as long as the rostrum without the proboscis, of fourteen rays, acuminate. The hinder half of the caudal section is less filiform than in *V. tentaculata* or *V. procera*, which suggests a possibility of greater length in other specimens.

Lateral line distinct, with a single row of pores, of which fifty-two lie between the skull and the vent. Between the anterior nostrils and the back of the interorbital space there are eight pairs of moderate sized pores, and distributed over snout and head minute pores are numerous. The proboscis or tentacle has great freedom of movement and its function is undoubtedly tactile. Total length thirty-seven inches.

Dark brown to black, edges of the fins and the mouth lighter, tentacle black.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3366	5° 30′ N.	86° 45′ W.	1067 fathoms	37° F.	Yl. glob. Oz.

Venefica tentaculata sp. n.

Plate M, fig. 2.

Long and slender, tapering to snout and tail, anteriorly subround, posteriorly compressed, tail filiform; depth about one forty-eighth of the entire length. Head slender, one ninth of the total, tapering from nape to proboscis. Snout little more than half as long as the head, wider than deep, narrow forward, slightly widened below the proboscis, which latter rises from the top of the prenarial section. A very slight rounded symphyseal expansion on the lower jaws which fits into a shallow concavity below the anterior nostrils and lacks one length of the orbit of reaching to the end of the snout. The tentacular proboscis is nearly round and about one third as long as the remainder of the snout from the eye forward. Eye small, close upon one ninth of the snout, inclusive of the tentacle, or nearly one sixteenth of the entire head from the gill openings. Mouth wide, cleft extending backward of the orbit about one third of the latter's diameter; jaws weak, lower slightly enlarged at the symphysis into a rounded extremity received behind the anterior group of teeth in a shallow excavation. Teeth very small, hooking back toward the gullet, very sharp on edges and apex, in villiform bands on jaws and vomer; forward band separated from the other vomerines by a space, narrowing or V-shaped forward, from which a notch extends outward in front of the maxillary bands. Anterior nostrils with a short tube, forward of the ends of the lower jaws, close to the base of the tentacle, directed forward; posterior near the upper half of the eye, oblique, oblong, with a valvular fold on the front edge. Gill openings small, subround, hardly as large as the eye, separated by a space about equal to the width. Vent at the end of the anterior third of the total length. Dorsal low anteriorly, first ray above the gill opening, containing three hundred and ninety-seven rays in the present specimen. Anal deeper than the dorsal, first ray below the one hundred and thirteenth ray of the latter (in a second specimen below the one hundred and fifteenth). Caudal narrow, of twelve rays, acuminate, continuous with dorsal and anal; caudal region slender and whip-like.

Four specimens at hand vary in regard to the position of the first ray of the anal, which lies below the ninety-third to the ninety-fifth rays of the dorsal. Otherwise there is no apparent specific distinction between the lots.

Black, tinted with chocolate brown over the muscular portions, lighter below the head and on the edges of the fins, tentacle tipped with white.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3364	5° 30′ N.	86° 8′ 30″ W.	902 fathoms	38° F.	Yl. glob. Oz.
3363	5° 43′ N.	86° 50′ W.	978 "	37.5° F.	Wh. glob. Oz.
3371	5° 26′ 20″ N.	86° 55′ W.	770 "	39° F.	Glob. Oz.
3418	16° 33′ N.	99° 52′ 30″ W.	660 "	39° F.	Br. S. bk. Sp.

NEMICHTHYIDÆ.

Serrivomer sector sp. n.

Plate LXIII.

Br. r. 7; D. 159–165; A. 161–160; P. 6–7 ; C. 6.

Slender, elongate, moderately compressed, tapering from the body to the snout and to the end of the tail; body cavity in the anterior third of the entire length. Head long, slender, deeper than wide, gradually decreasing in size from the occiput to the end of the snout, nearly one fifth of the total length. Snout long, acute, two fifths as long as the head, six times as long as the eye. Mouth wide, less than half as long as the head, extending little behind the orbit; maxillaries not reaching to the end of the snout by about one fourth of the length of the latter, slender, not expanded at the end. Jaws posteriorly stronger, anteriorly slender; lower jaw one half the orbital length longer than the upper; lower corner of the angular resembling a short spine. Three forms of teeth on each jaw, Plate LXIII. fig. 3, the outer of several rows, very small, compressed, subtriangular, sharp-edged; the median of a single series of longer, lancet-shaped depressible teeth; and the inner of less developed, less compressed teeth, not so evident on the upper jaws. Vomerine teeth much larger, blade-like, in two series, the teeth of which alternate to form what at first sight appears to be a single, compressed serrate row, extending much forward of the maxillaries, decreasing in size to very small in the anterior half of their extent. In the posterior half of the vomerines each tooth is thin, wide, more than twice as high as wide; the outline of the basal portion is subquadrate, of the apical portion an isosceles triangle about one and one half times as high as wide, or of the portions taken together something of an arrow-shape; posteriorly the series end near or upon a vertical through the posterior nostril. The compressed teeth in the outer row on the jaws resemble the apical portions of the vomerines, but the outline more nearly forms an equilateral triangle. Eye moderate, one sixth to one seventh as long as the snout, one seventeenth of the length of the head. Nostrils small, near the eye and on the level of its upper edge, anterior with a short tube. Four gills; laminæ short; rakers absent; openings wide, about three times as wide as the eye, low on the side, descending forward; membranes united, joined to a thin partition attaching them to the isthmus.

The skeleton of Serrivomer presents a number of peculiarities more or less divergent from what obtains in allied genera, as may be seen on Plate LXIII. figs. 2–5. The acquisition of the acuminate snout has been attended by extensive cranial modifications, as compared with other fishes. Some of the bones of the skull have disappeared, and others have consolidated to such an extent that their identity is not readily established. The maxillaries, sphenoids, vomer and frontals account for about all the elements present in the preorbital section of the skull; intermaxillaries, nasals, prefrontals, palatines and suborbitals have vanished. The upper teeth are vomerine and maxillary, the former of both sectorial and raptorial teeth, the latter of raptorial teeth mainly. The preoperculum is somewhat elongate and in the posterior half is rather broadly expanded into a very thin sheet; the operculum also is thin and broadly expanded down and backward; the interoperculum is slender elongate and pointed anteriorly and is broadened and thin backward, and the suboperculum has been reduced to membrane or is absent. In the throat the glossohyal is long and pointed; the urohyal is subtriangular, thickened and heavier at the base, and tapers to a point below, at the attachment of a strong tendon passing back under the basibranchials: stylohyal, epihyal, ceratohyal and basihyal are consolidated; and the branchiostegal rays are very long slender and hair-like and curve upward near their extremities, Plate LXIII. fig. 4. The branchial skeleton is shown in fig. 5 of this plate; all of the bones are elongate and slender. Certain features of the vertebræ over the branchial chamber distinguish this genus from genera like Labichthys and Nemichthys or from such as Venefica and Xenomystax. The neural spine of the first vertebra behind the head rises from the hinder portion of the centrum and reaches backward over the second vertebra; the neural spine of the latter rises above the middle of the centrum and passes upward almost vertically; the spine of the third vertebra, as that of each of the five vertebræ immediately back of it, rises from the forward portion of the centrum and extends forward. The ends of the spines of the first and the third vertebræ are close together at the apex of the spine of the second vertebra. The ninth vertebra, has two neural spines, one at each end of the centrum, of which the anterior is extended forward, as in case of the third to the eighth, while the posterior is directed backward, as is the case with the spines of the tenth and following vertebræ, each of which bears a single spine, that on the hinder half of the centrum. In the scapulary arch there is but a single elongate element. Carpals, radius and ulna are represented by the peculiar little semicartilaginous plate attached to the scapulary and bearing the minute six-rayed pectoral, Plate LXIII. fig. 3.

The stomach is a long sac, pointed at the posterior extremity, which reaches some distance behind the vent; the short intestine leaves it on the lower side near the hinder two fifths of its length and passes back nearly straight to the end.

Pectorals small, as long as the orbit, at the upper angle of the gill aperture, of six to seven rays. Vertical fins low, better developed toward the caudal; dorsal lower, originating above the eleventh ray of the anal fin; anal origin about one third and dorsal about two thirds of the length of the head behind the latter; caudal acuminate. On some individuals the caudal base is truncate and bears six rays the median of which are longest; on others the base is more rounded and the rays of dorsal and anal appear to meet behind it.

Total length twenty-two and one half inches.

Black with more or less of a silvery shine, or in young specimens silvery with more or less of blackish. In cases the appearance is dark silver grey, in others the skin is silvery with numerous dots of black, or black with silvery spaces, or in some the black predominates anteriorly and the silver posteriorly; caudal white, hinder edges of dorsal and anal light.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard.
3393	7° 15′ N.	79° 36′ W.	1020 “	36.8° F.	Gn. M.
3388	7° 6′ N.	79° 48′ W.	1168 “	36.2° F.	Gn. glob. Oz.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 “	35.8° F.	Gn. M.
3376	3° 9′ N.	82° 8′ W.	1132 “	36.3° F.	Gy. glob. Oz.
3371	5° 26′ 20″ N.	86° 55′ W.	770 “	39° F.	Glob. Oz.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 “	54.8° F.	Rks. and S.
3361	6° 10′ N.	83° 6′ W.	1471 “	36.6° F.	Gn. Oz.
3360	6° 17′ N.	82° 5′ W.	1672 “	36.4° F.	Fne. bk. dk. gn. S.

“ Off Guaymas, 50 miles south.” “ Surface to 700 fathoms.”

Labichthys Bowersii sp. n.

Plate LXIV. fig. 1.

Br. r. 9 ; D. 252 ; A. 234 ; P. 15 ; C. 6.

Very long and narrow ; head nearly one eighth of the total, moderately broad and flattened on the crown, rising rather gradually from the snout to the top, and not so abruptly as in *Nemichthys fronto*, in length equalling one and one fourth times the distance from the gill opening to the vent. Snout greatly elongate, slender, from the tip to the eye equal to two and one half times the length of the balance of the head from the front edge of the orbit to the gill opening, jaws curving from one another near the end, lower jaw shorter. Nostrils close together, near the eye ; anterior near the jaw with a short tube ; posterior nearer the upper part of the eye. Mouth wide, cleft little backward of the eye. Teeth very small, in pavements or broad bands on jaws and vomer, very sharp, hooking backward, vomerine band ending below the forward part of the eye. Apparently there are but nine branchiostegal rays, though the condition of the specimen is such as to raise question whether the series is entire. Eye small, one twelfth as long as the snout, one eighteenth as long as the head, prominent. Gill openings as wide as the eye, extending over the lower two thirds of the bases of the pectorals, separated on the breast by a space of less than half the width of an opening.

Lateral canal with a single series of rather large pores opening directly outward.

Dorsal fin about two diameters of the eye farther backward than the bases of the pectorals, much lower than the anal, represented on the specimens at hand by a series of short spines from which the extremities have been carried away. First ray of the anal below the twenty-fourth ray of the dorsal, fin deeper than the latter. Caudal small, of six rays, continuous with dorsal and anal, median rays longest. It is quite possible the tail is not quite of its normal length, in which case dorsal and anal will on others be found to contain more rays. Pectorals short, moderately broad, of fifteen rays, upper ray shorter, stouter, and compressed into a thin keel-like upper (forward) edge; bases very obliquely situated, so that the fin is carried almost on a horizontal plane with the upper edge forward.

Uniform black, bands of teeth showing light to white, younger individuals closely puncticulate with dark.

The specific name is given in honor of the Hon. George M. Bowers, the present head of the United States Fish Commission.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3414	10° 14′ N.	96° 28′ W.	2232 fathoms	35.8° F.	Gn. M.
3388	7° 6′ N.	79° 48′ W.	1168 "	36.2° F.	Gn. glob. Oz.
3361	6° 10′ N.	83° 6′ W.	1471 "	36.6° F.	Gn. Oz.

Nemichthys fronto sp. n.

Plate LXV. fig. 1.

Br. r. 14 (15); D. 365 ca.; A. 369 ca.; P. 11.

Greatly elongated, very slender, compressed, filiform in the tail; snout to gill opening nearly one tenth of the total length. Head narrow, with the rostrum on a level with the lower part, outline rising over the nostrils and orbit, high at the nape, somewhat concave between the eyes, rounded toward the sides, narrower at the throat. Snout two thirds as long as the head, jaws slender and curving from one another near the end. Eye large, about one seventh of the length of the snout or one twelfth of that of the head; pupil round. Mouth very wide, cleft to a vertical from the hind border of the orbit. Teeth small, flattened or depressed and sharp edged on the crown, hooking back toward the gullet, in pavement or bands that are more or less exposed at the sides of the mouth, maxillary band reaching as far backward as the hinder edge of the eye; vomerine band ending in a sharp point below the middle of the eye. Nostrils close together, near the eye; anterior with a short tube, in front of the middle of the eye; posterior tubeless, in front of the upper portion of the orbit. Corner of the angular sharp, but not very prominent. Opercles thin, flexible, hind border rounded. Gills four, a slit behind the fourth. Gill openings little wider than the eye; membranes united, joined to the isthmus, attached to the base of the pectoral below its middle. Vent hardly one fourth of the ocular length backward of the base of the pectoral.

Dorsal low, originating one half of the orbital diameter behind the occiput, shorter rays backward and degenerating into a series of small, backward-curved, sharp pointed spines. These spines appear near the hundredth ray of the fin and continue for about a hundred rays farther back, where the character again approaches that of the ordinary fin rays. Anal much deeper than the dorsal, first ray below the seventeenth dorsal ray, posterior rays not modified like those in the dorsal fin. Pectorals narrow, little more than twice the orbital length.

Lateral line with three series of small pores the upper and the lower of which open through short tubes while the median opens directly from the canal. In reality the pores are grouped in fours, as was figured by Brandt in 1850, the groups being separated by single pores of the median series. This grouping is a characteristic of the genus.

Blackish with reddish tint over the muscular portions, probably black in life. On the specimen from the greater depth the dark color when under the lens is more diffused and does not appear as distinct puncticulations, as is the case on the specimen described above from a thousand fathoms and more nearer the surface.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.
3434	25° 29′ 30″ N.	109° 48′ W.	1588	36.4° F.	Br. M. bk. Sp.

ATOPICHTHYES.

Heretofore certain pelagic, much compressed, band-like, translucent to transparent, larval fishes have been placed in the genus Leptocephalus of Gronow, 1763. The type of the genus is *Leptocephalus Morrisii* Penn., 1776, a larval form which has lately been traced to its adult in *Muræna conger* Linn., 1758, which, again, was the typical species of Risso's genus Conger, 1826. In consequence Leptocephalus has taken the place of Conger as the title of the genus and many of the Leptocephalids which do not belong to that genus and cannot yet be definitely located are left unnamed. That there is a considerable number of these larval forms that cannot be placed in Leptocephalus, but that belong to various other genera not now determined with sufficient accuracy is evident enough from the figures and descriptions given below. Rather than to assign them at random it is here proposed to form a group for these and similar unplaced larvæ, Atopichthys, in which they may remain until such time as by means of larger collections the adult forms and their respective generic affinities may be determined. To give a specific name to each type of Atopichthys will be likely to introduce synonyms in some cases, yet at the moment there appears to be no better way, in which to avoid the risk and at the same time to secure facility of reference.

A most important and recent addition to the knowledge of the Atopichthyes is a publication by Strömman, 1896, in which fourteen new species were described and figured. All of these species were placed in Leptocephalus; such of them as do not belong to the congers will be placed in Atopichthys until their development is traced.

With tolerable nearness, the horizontal distribution of the Atopichthyes corresponds with that of the Murænoids. These forms are pelagic, it is true, but it is likely the adults of most of those described below are found at great depths, and in view of their life histories to be written in the future they are introduced here in the report on the bathybial species. As yet no species of the genus Leptocephalus are known to occur in the eastern Pacific. The species of Atopichthys in the collection most resembling *L. Morrisii* are probably young of Uroconger or of Congermuræna. Other species with tubular anterior nostrils, on Plate LXVII., may represent species of Ophichthys; another species with a nostril in front of the lower half of the eye may belong to a species of Chlopsis, a genus apparently replacing Nettastoma in this region; and another with a nostril midway from the eye to the end of the snout may prove a Xenomystax. One species of the lot, Plate LXV. fig. 2, is closely allied to *Esunculus Costai* Kaup, of which Günther, 1870, remarked "this fish is clearly the young of a form belonging to one of the more highly organized Physostomous families, perhaps of *Alepocephalus*." Whether the species figured below belongs to Alepocephalus or to Bathytroctes, as is more likely, or to some other genus of the family is not to be decided from the material at hand. The great differences in the numbers of the fin rays, as compared with those of *E. Costai*, make it doubtful whether the adults of the two forms belong to one genus. Possibly our species is a young Albula.

Atopichthys esunculus sp. n.

Plate LXV. figs. 2, 2 a.

D. 16–17; A. 8; P. 13; V. 8; C. 25.

The form of this species closely resembles that of *E. Costai* as given by Kaup, 1856, Cat. Apodal Fish, Pl. XVI., fig. 3.

The body is much compressed and attains its greatest depth, which is about one seventh of the total length, at about three fourths of the distance from the snout to the tail, whence it gradually tapers to the head. Body cavity very long, close upon seven eighths of the total.

Head small, comparatively narrow, subconical, near one twelfth of the entire length, convex on the crown and on the top of the snout, moderately blunt and rounded in front. Somewhat pointed, arching upward above the mouth, shorter than the eye. Eye large, one third as long as the head, longer than the snout, lateral. Mouth large; maxillary extending below little more than half of the eye. Teeth on the lower jaw large, slender, acicular, compressed, inclined forward; on the upper jaw smaller, very slender, vertically directed. Nostrils small, in front of the eyes, midway to the end of the snout. Gill openings wide, passing from in front of the pectoral base down and forward to below the eyes.

Pectoral fins small, of about thirteen rays, reaching the eye.

Ventrals small, of eight rays, bases below the thirty-fifth transverse muscle segment, which is nearly in the middle of the length.

Dorsal of sixteen or seventeen rays, shorter backward, the first above the fifty-fourth muscle-segment or about the beginning of the posterior fourth of the total. Anal short, of eight rays, close to the caudal, originating below the sixty-seventh muscle-band. Caudal short, rather deep, deeply forked, of twenty-five rays. Vent below the sixty-sixth muscle-segment.

Translucent or transparent; with black pigment in a streak of puncticulations along the upper edge of the intestine, in a dot on the caudal pedicel forward of the bases of the rays, and in a transverse band across the bases of eight or ten of the inner rays of the caudal.

"Off Acapulco, Apr. 13, 1891."

Atopichthys sicarius sp. n.

Plate LXVI. figs. 1–1 b.

Narrow, elongate, slender, greatest depth one eighteenth of the entire length. The greatest depth is attained in the anterior fourth of the length which also apparently contains the vent. From this portion the form tapers gradually to the filamentary caudal. Head small, narrow, twice as long as high, near one fourteenth of the total length, rather pointed at the snout, slightly concave in the longitudinal outline above the posterior nostrils. Snout long, less than half as long as the head, slender, blunted at the end. Eyes lateral, large, situated in the middle of the length of the head, one sixth as long as the latter. Nostrils small; posterior forward of the middle of the eye about one half of the latter's diameter; anterior the same distance from the end of the snout and midway from the lip to the top. Mouth very large, cleft reaching below the middle of the eye, jaws equal in length. Teeth comparatively large, sectorial, compressed, acute, inclined forward, an anterior pair on each series longer hooked and protruding as canines. On each of the lower canines the upper edge bears a short denticle near the end of the tooth. Gill openings as wide as the eye, forward of and extending lower than the bases of the pectorals. Gill membranes united with the isthmus. About fifty of the transverse muscular bands are in front of the vent and about two hundred behind it.

Pectorals small, as long as the eye, pointed, moderately broad. Dorsal and anal indistinct, apparently united with the bases of the caudal rays. Caudal narrow, elongate, acute.

Pigment appears in a blotch on the end of the snout at each side in front of the nostril, in another at the forward end of the chin, in a transverse streak in front of the nape, in a series of spots separated from one another by about twelve segments on the median line of the flank, disappearing backward, and in a series of rather widely separated spots from the throat along each side of the intestine and the anal fin. Some fainter blotches appear under the opercle. The spots along the intestine may be luminous; possibly this also may be the function of the deep seated spots along the flank.

Total length four and one half, greatest depth one fourth, and length of the head five sixteenths inches.

Station, 3357; Lat., 6° 35′ N.; Lon., 81° 44′ W.; Surface townet, Time, Feb. 24, 6^h 17^m A.M., over a depth of 782 fathoms, with a Temp. 38.5° F.; and Bottom, Gn. S.

Atopichthys cinctus sp. n.

Plate LXVI. figs. 2, 2 a.

Deeply compressed in the body; greatest depth behind the middle, about one eighth of the total length; upper and lower outlines curved, converging more rapidly behind the vent; with one hundred and eleven transverse muscle bands forward of the vent and twenty-seven behind it. Head small, one sixteenth of the total, narrow, sharp pointed at the snout, tapering regularly from the body; crown concave in front of the eye, longitudinally sinuous in outline, transversely convex. Snout acute, nearly one third of the head, lower jaw hardly shorter. Eyes large, lateral, two sevenths as long as the head, nearly as long as the snout; iris silvery, edged with black around the pupil, with a black bar along the top. Mouth large, reaching almost to a vertical from the middle of the eye; prominence of the angular little forward of a vertical from the hind edge of the orbit. Teeth sectorial, compressed, acuminate, with a low ridge on the outer side, inclined forward; those on the upper jaws abruptly becoming smaller and closer together below the posterior nostril; an anterior larger protruding canine in each series. Nostrils small; posterior on the level of the middle of the eye and close to the front edge of the orbit; anterior near the end of the snout and at a short distance from the lip. Gill openings narrow, one third as wide as the eye, in front of and extending slightly lower than the bases of the pectorals. Vent near the one hundred and seventh muscular segment.

Pectorals small, half or less than half as long as the eye, as broad as long; rays short, radiating from a rounded base that is more than a semicircle. Vertical fins continuous around the tail; dorsal little longer than the anal; caudal small, pointed. Caudal rays and those of anal distinct, the latter short; those of the dorsal are visible to a distance from the caudal equal to twice the length of the anal.

Translucent to transparent. With black pigment in two groups of three small dots each at each side of the throat below the operculum, in a series of dots on each flank between the muscles and the intestine, in a much closer series of smaller dots along the bases of the anal and the caudal, and in a few dots along the bases of the hinder rays of the dorsal fin.

Though in general this species bears some resemblance to the *A. altus* of Richardson, 1848, Voy. Ereb. & Terr., Fish, 51, Pl. XXX. fig. 8–10, it is readily distinguished from that species by the anal fin, which is nearly twice as long.

Station, 3410; Lat., 0° 19′ N.; Lon., 90° 34′ W.; "Surface Townet," Time, 8^h 48^m P. M., Apr. 3, 1891, over a depth of 331 fathoms, for which the Temp. was 44.2 F. and the Bottom black sand.

Atopichthys dentatus sp. n.

Plate LXVI. figs. 3, 3 a.

Narrow and deep, the greatest depth, near the middle of the length, is equal to the post anal length or nearly one eighth of the total. Upper and lower outlines curved throughout, converging very slowly until near the ends; caudal region retaining a considerable depth, blunt at the end. Head one seventeenth of the entire length, acute, convex across the crown; upper longitudinal outline straight, lower curving upward on the chin; width little more than that of the body. Snout about two fifths of the length of the head, one and one half times as long as the eye, sharp. Eye large, lateral, nearly one fourth of the head-length. Mouth large, cleft reaching behind a vertical from the middle of the orbit; prominence of the angular behind a vertical from the hind border of the orbit; lower jaw little shorter. Teeth sectorial, compressed, with a low ridge along the middle of the outside; a pair of large hooked canines on the upper jaws includes the similar pair on the front of the lower jaws; spaces separating the canines from the other teeth little longer than those farther back; posterior teeth of the upper jaws below the forward edge of the eye abruptly becoming much smaller and closer together and thus continuing backward. All the teeth are inclined forward; the canines protrude and each pair includes a couple of small teeth. There are nine or ten teeth forward of the smaller crowded teeth in the upper jaw. Nostrils medium; posterior immediately in front of the eye; anterior smaller, behind the mid-length of the snout. Gill opening moderately wide, twice the width of the pectoral base, extending down to the isthmus. Muscular segments ninety-seven plus twenty-four.

Pectorals deep and short, two fifths as long as the head, hind border rounded. The rays of the anal and those of the dorsal behind the vent are somewhat distinct; those of the caudal are still more so and much longer. Caudal fin blunted at the end.

Translucent; muscular portions of the head flesh colored and opaque; pectorals and opercles with brownish spots or cloudings; isthmus with several dots at each side; a more or less irregular series of spots, probably luminous, at each side of the intestine; a series of larger luminous spots, somewhat irregularly placed and spaced, close to the median line of the flank, each spot of which is situated on the hinder edge of the muscular segment at the groove between it and the next segment. Forward, a number of the segments here and there are without spots in the median series; behind the mid-length the series is more regular. On and near their bases the rays of anal and caudal bear very small streaks of black.

Total length three and four tenths, head two tenths, depth four tenths, at the mid-length, and snout to vent three inches.

Compared with *A. falcidens* the species here described has a smaller eye, a longer snout, a straighter crown, a wider caudal region and a smaller number of segments in body and in tail.

Station, 3375; Lat., 2° 34′ N.; Lon., 82° 29′ W.; Surface townet, over a depth of 1201 fathoms with a bottom of Gy. glob. Oz., with a Temp. of 36.6° F.; Time, $6^{h}\ 26^{m}$ A. M., March 4, 1891.

Atopichthys falcidens sp. n.

Plate LXVI. figs. 4, 4 a.

Comparatively short and very narrow; greatest depth, in the anterior half, about one ninth of the total length, caudal region tapering regularly along the bases of the fins. Head nearly one eighteenth of the entire length, upper longitudinal outline arched over the orbit and slightly concave above the nostrils, lower outline convex in the mandibles, width greater than that of the body, convex across the crown, tapering from the nape, acute at the snout. Snout sharp, narrow, compressed or roof-shaped across the top, little longer than the eye. Eye large, nearly one third as long as the head; iris silvery, deeper than long, narrowed below. Mouth large, cleft nearly underreaching the forward half of the eye; prominence of the angular close to a vertical from the hind border of the orbit; lower jaw little if any longer. Teeth large, sectorial, compressed, slender, acuminate, inclined forward, with a rather distinct ridge along the outer side. One or two small teeth in front on each jaw, separating a pair of large falciform canines, are subconical. The canines are separated from the backward teeth by a wider interspace. Behind the eighth or ninth tooth of the upper jaw, backward of the posterior nostril, the teeth abruptly become much smaller and closer together. The upper teeth pass outside of the lower. Nostrils medium;

anterior below the level of the posterior, halfway from the eye to the end of the snout; posterior forward of the upper half of the eye, halfway from the anterior to the orbit. Gill openings small, not as wide as the eye, not reaching as high as the upper edge of the pectoral. Muscular segments one hundred and eighteen, plus about thirty-five behind the vent.

Pectorals short, not reaching halfway to the eye, nearly as deep as long. From the vent the caudal region is more acute or tapering than on *A. dentatus*. The caudal rays are inserted on two basal pieces, each bearing five rays, the lower of the two being the shorter; fin pointed.

Total length three and five sixteenths, length of head three sixteenths, length of caudal fin one sixteenth, snout to vent three, and greatest depth — near the mid-length — three eighths inches.

Translucent or transparent, muscular portions of the head more opaque. A group of four or five small spots of black lies below the preopercular and orbital regions; another group of about five lies below the operculum; a series of light-centred black spots extends along the median line of the flank from the head to the tail, each spot of which lies near the line at the groove separating the transverse bands of muscle; and another series, of a larger number of similar spots, extends along the upper edge of the intestine. The spots are like those of *A. dentatus*, Pl. LXVI., fig 3, and greatly resemble those of Scopeloids. These species are evidently closely allied, the adult forms no doubt being of a single genus, but *A. falcidens*, has a larger eye, a shorter snout, more arch upon the crown, a narrower caudal region, and more segments in body and in tail, which suffice to distinguish them.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3388	7° 6′ N.	79° 48′ W.	1168 fathoms	36.2° F.	Gn. glob. Oz.

Submarine townet, Time, March 9, 1891, 6h 41m A. M.

Atopichthys acus sp. n.

Plate LXVI. figs. 5, 5 a.

Much compressed, depth greatest behind the middle of the length, nearly one eleventh of the total, decreasing gradually forward and somewhat more rapidly backward. Head small, strongly compressed, little wider than the neck, narrower and sharp pointed at the snout; forehead narrow, slightly arched longitudinally, very convex transversely. Eye large; orbit as long as the snout, one third as long as the head; iris black. Mouth large, extending below the forward part of the eye; mandibular angle below the middle of the orbit. Teeth sectorial, comparatively large, acicular, long, very sharp, compressed and widening toward the bases, with a slight ridge down the outside of the larger, somewhat inclined toward the end of the snout. An anterior pair of large canines in each series, separated from the other teeth by a wider interspace. Upper teeth more erect. Nostrils very small, situated much above the lip, distant from the end of the snout, posterior near the eye anterior a short distance farther forward. Gill openings small, oblique, as wide as the eye, in front of the bases of the pectorals. Vent in a prominence at the caudal fin. There are one hundred and twenty-seven muscle-bands forward of the vent and only eight between it and the caudal.

Pectorals small, about as broad as long, short, hardly half as long as the eye. Caudal ending in an angle of less than ninety degrees.

Translucent or transparent; pigment arranged in very small dots in a closely set series from the throat backward about one fourth of the length, in one to two series on the median line of the back to the caudal fin, in short close series, of four to thirty each, in each groove between the muscle-bands from the median line of the flank downward on the side, and in a series on the base of the caudal around the bases of the rays. The spots along the intestine have the structure of those on *A. dentatus*, *A. falcidens* and others and are presumably luminous organs; they have the black spot with a black centre surrounded by a silvery ring. The spots on the flank do not show the silver color and may be non-luminous.

Total length six and three fourths, depth five eighths, length of the head three sixteenths and snout to vent six and nine sixteenths inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.	Time.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 fathoms	35.8° F.	Gn. M.	Mar. 6, 8^{h} 38^{m} A. M.

Atopichthys ophichthys sp. n.

Plate LXVII. figs. 1, 1 a.

Body narrow and deep, deepest portion at a short distance behind the vent one eighth of the entire length, outlines above and below converging with some regularity toward the blunt extremity of the tail but remaining more nearly parallel forward till within fifteen or twenty segments of the head where the convergence is much more rapid. Vent little behind the middle of the total length. Head small, subconical, little deeper than wide, tapering but slowly forward till near the snout, nearly one fourteenth of the total length, crown convex. Snout subconical, blunt, one fourth as long as the head, one and one third times as long as the eye. Eye lateral, large, one sixth of the length of the head, equal to the width of the interorbital space, three fourths as long as the snout. Mouth large, extending to or beyond a vertical from the hind edge of the orbit. Teeth minute, apparently conical, only visible under lenses of high power. Nostrils small; posterior smaller, in front of and near the middle of the eye; anterior near the end of the snout, in a tube at the lip. Gill opening small, narrower than the eye, immediately in front of the pectoral base. Vent below the seventy-ninth muscle-segment.

Vertical fins continuous around the tail; anal less than half of the entire length; caudal very short, forming a blunt angle at the end; pectorals small, twice as long as wide, as long as the snout.

Translucent or transparent, without pigment.

The peculiar structure seen in the tail is suggestive of an adult form resembling Ophichthys, that is, with the tip exserted beyond the dorsal and the anal and bearing no fin rays. In the present case the muscle bands extend as far backward as the bases of dorsal and anal, while beyond them between the rays of the fins a soft band in which there are no rays reaches back to form a blunted angle behind the ends of the mentioned fins.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3366	5° 30′ N.	86° 45′ W.	1067 fathoms	37° F.	Yl. glob. Oz.

Surface townet, Time, Feb. 27, 1891, $8^{h}\ 4^{m}$ P. M.

Atopichthys cingulus sp. n.

Plate LXVII. figs. 2, 2 a.

Pointed at head and tail, the angle at the former being a little the sharper, greatly compressed, eight times as long as deep, the depth decreasing rather abruptly near each extremity. The distance from snout to vent is somewhat more than half the total length. Transverse muscle segments, one hundred and thirty-one to one hundred and thirty-three.

Head wider than body, length less than half the depth of the latter, higher than wide, forehead very convex transversely. Snout pointed, longer than the eye. Eye large, shorter than the snout, near one sixth as long as the head. Mouth wide, cleft hardly reaching a vertical through the middle of the eye; lower jaw shorter. Teeth short, subconical, visible under strong lenses. Nostrils small; posterior nostril as near to the lip as to the orbit, nearer to the latter than to the anterior; anterior nostril with a short tube, nearer to the end of the snout than to the posterior, and nearer to the lip.

Gill opening small, about half as wide as the eye, in front of the base of the pectoral.

Pectorals small, one third as long as the head, twice as long as the eye, pointed, of fifteen rays. Vertical fins continuous around the tail. Dorsal origin not far from two ninths of the distance from snout to end of caudal. Anal origin close to the vent. Vent below the sixty-fifth muscle segment.

Lateral line in the first half dozen segments descending to the median line of the flank.

Anal fin and hinder portion of dorsal, for the greater part of the length, internally marked on the bases of the rays by small spots of black pigment. No other pigment on the specimen.

Total length seven, greatest depth seven-eighths, length of head three-eighths, depth of head three-sixteenths, snout to dorsal fin one and nine-sixteenths, and snout to vent three and five eighths inches.

Station, 3354; Lat., 7° 9′ 45″ N.; Lon., 80° 50′ W.; Surface townet, Time, Feb. 25, 1891, $1^h\ 25^m$ P. M.; over a depth of 322 fathoms; Temp., 46° F.; Bottom, Gn. M.

Atopichthys lychnus sp. n.

Plate LXVII. figs. 3, 3 a.

Narrowly compressed in the body, greatest depth one nineteenth of the total length, moderately pointed in front, acute and slender at the tail, deepest behind the middle of the total, tapering gradually forward and more rapidly backward. Distance from snout to vent more than half of the entire length. Head little wider than the body, higher than wide, in length one eighteenth of the total; crown convex longitudinally and very convex transversely. Snout compressed, subconical, rounded, blunt, deeper than high, little more than one fourth as long as the head. Eye large, as long as the snout, one diameter distant from the end of the latter, iris silvery and higher than long, blackish at the upper edge of the orbit. Mouth large, hardly reaching below the middle of the eye; lower jaw ending in a sharp angle on a vertical from the hind border of the orbit, little shorter than the upper. Teeth sectorial, compressed, with a low keel on the outer side, each tooth starting from the socket erect, then, at a short distance from the base, bending forward, larger and farther apart forward in both jaws, abruptly becoming smaller, more slender and closer together below the forward edge of the eye in the upper jaw, the pair of large protruding canines in each series separated by one or a pair of small subconical teeth. Nostrils small; posterior near the upper part of the eye; anterior near the end of the snout, at a distance from the lip, its margins slightly raised. Gill opening small, more than half as wide as the eye, in front of the base of the pectoral.

Vertical fins continuous around the tail; rays longer toward the caudal. Dorsal origin in the anterior third of the length. Pectorals small, as long as the snout, of fifteen rays. Caudal slender, acuminate, more than half as long as the head. Vent below the seventy-eighth muscular segment. The total number of segments is about one hundred and sixty-five.

Entire length four and one half, depth one half, head one fourth, snout to vent two and five eighths, and snout to dorsal one and one fourth inches.

Whitish, translucent or transparent; several irregular blackish blotches showing through the opercle; four or five round spots of black along the lower edge of the preopercle; several spots are scattered over the face, and a series of deep seated small spots of black extends along the median line of the flank from head to tail; a series of small spots of silver, each upon a larger spot of black, passes along each side of the lower edge of the abdomen; base of anal fin with two series of smaller closely set spots on each side, the lower of the series having the smaller spots. The spots along the side are eyelike and have more or less of a silvery iris surrounding a black centrum as in the cases of *A. falcidens*, *A. dentatus* and *A. acus*.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 9′ 45″ N	80° 50′ W.	322 fathoms	46° F.	Gn. M.

Surface townet; Time, Feb. 23, 1^h 25^m P. M.

Atopichthys obtusus sp. n.

Plate LXVII. fig. 4, 4a.

Body very narrow and deep, greatest depth near the middle, about one ninth of the total length, comparatively short, upper and lower outlines curving with much regularity, body cavity entirely within the forward half of the total. Head small, short, nearly one twelfth of the entire length, wider than the neck, hardly as wide as deep, subconical, blunt at the end of the snout, arched above the orbits, crown convex transversely and slightly so longitudinally. Snout rounded, not sharp, one and one third times as long as the eye, one fourth as long as the head. Mouth large, extending backward of a vertical from the middle of the eye, jaws about equal. Eyes large, lateral, prominent, nearly one sixth as long as the head, iris silvery. Teeth subconical, very small. Nostrils small; posterior close in front of the middle of the eye; anterior tubular, near the end of the snout at the edge of the lip overhanging the mouth. Gill opening vertical, narrow, not as wide as the eye, forward of the base of the pectoral. Vent below the fiftieth muscular segment. Muscular segments fifty plus sixty-nine.

Pectorals rather broad, twice as long as the orbit, about one third as long as the head, rounded on the hind margin. Vertical fins confluent, broadening near the caudal, which latter is short and blunt.

Translucent to transparent, with black pigment in a series of spots backward from the seventeenth or the eighteenth muscle-segment, close below the median line of the flank, to the tail — commonly one but sometimes two spots on each segment, in a short series of four or five dots inside of each gill membrane on the throat, in a couple of irregular series below the intestine — more numerous backward, and in a line of faint dots to be seen along the bases of the anal rays.

Total length four and three eighths, greatest depth one half, length of head three eighths, and snout to vent two and one eighth inches.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.	Time.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 fathoms	48° F.	Fne. gy. S.	Mar. 8, 1891, 4^{h} 54^{m} P.M.

Atopichthys longidens sp. n.

Plate LXVII. fig. 5, 5a.

Comparatively short, much compressed, greatest depth near one seventh of the total length, forward of the middle, depth decreasing but little until near the extremities. One hundred and forty transverse muscular segments, of which fifty-one are forward of the vent. A rather wide transparent margin, dorsal and anal, outside of the muscle-segments. Head small, about one thirteenth of the total; pointed in front, little wider than the body. Snout acute, two fifths as long as the head, one and two thirds times as long as the eye; the shape in some degree suggestive of the snout of Thyrsites. Eyes large, three fifths as long as the snout, nearly one fifth of the length of the head, with lateral outlook. Mouth large; maxillary reaching backward of the middle of the eye; jaws nearly equal in length. Teeth large, acicular, very slender, inclined obliquely forward, gradually becoming smaller backward, an anterior pair of large canines protruding on each jaw. Nostrils small, posterior near the eye, anterior about midway from the eye to the end of the snout. Gill openings medium, forward of and below the level of the bases of the pectorals; membranes united, joined to the isthmus. Vent below the fifty-first muscular band.

Pectorals broad, as long as the snout. Dorsal and anal apparently a thin transparent membrane without visible rays, continuous with the caudal but becoming very narrow toward the base of the latter. Caudal fan-shaped, the rays radiating from the base, rounded or blunt pointed on the hind margin.

Transparent; with black pigment in a pair of dots above the angle of the jaws, in a series of three or four a little farther backward, in a group of six still farther back — below the throat, in a series of closely set ones along the upper edge of the intestine, and in one or two series along the median line of the flank. The dots along the flank make their appearance a short distance behind the head and are — in the median line — placed in the groove between the bands of muscle with, near the middle of the entire length, occasional dots on the muscle of the bands between the dots in the grooves. Not far from the origin of the median series and close below the latter a second series begins, the dots of which are also placed in the grooves; it continues almost to the end of the series above it.

Total length two and one half, length of head three sixteenths, depth three eighths, and length of body cavity fifteen sixteenths inches.

Station.	Latitude.	Longitude.	Depth.	Time.
2627	0° 36′ N.	82° 45′ W.	Surface to 1740 fathoms	6^h 49^m A. M. March 25, 1891.

MYXINIA.

SYMPHYTOBRANCHII.

The names *Cyclostoma* Lam., 1801, and *Cyclostomus* Montf., 1810, both having been used in the Mollusca, there is question of the propriety of retaining either Cyclostomes, 1806 (Family name, in French), Cyclostomia, 1815 (Family), Cyclostoma, 1825 (Order), Cyclostomi, 1831 (Order), or Cyclostomata, 1832 (Division), for a general term in connection with the Myxinoid fishes. Aulœdibranchia, 1825 (Family), and Diporobranchia, 1825 (Family), are not particularly appropriate for more comprehensive designations. Gymnobranchii, 1832 (Order) is inapplicable on account of prior use of Gymnobranches, 1816, in Crustacea, and of Gymnobranchiata, 1820, and Gymnobranchia, 1821, in the Molluscs. Symphytobranchii, 1832 (Tribe), is less objectionable, while Marsipobranchii, 1838 (Subclass), is suitable in other respects but lacking too much in regard to priority. Dermoptères, 1806, and Dermopteria, 1815, were originally names for a family including only Salmonidæ and Characinidæ. Discarding Cyclostomia, choice apparently is limited to Myxinia, Symphytobranchii, and Marsipobranchii in selecting a class name for the Myxinoids. To adopt Myxinia, from Rafinesque's subfamily of 1815, his family name, Cyclostomia, also 1815, being an infringement on Cyclostoma 1801 and Cyclostomus 1810 of the molluscs, will give less occasion for recurrent unsettling discussions of priority than in case of either the tribe or the subclass name, however much one of them might be preferred in some respects.

Previous to the year 1891 the known horizontal distribution of the marine Myxinia was about as follows: Geotria had been secured off the coasts of Chili and of South Australia, Mordacia off the coasts of Chili and of New Zealand, Petromyzon off the western coasts of Europe, off the northeastern and the northwestern coasts of North America, off the southeastern coasts of South America, and off the coasts of Japan, Homea off the coasts of Chili, of California, of New Zealand, and in the "South Seas," and Myxine off the coasts of Europe, of the northeastern United States, of southern South America and of Japan. To this the present material adds a new species of Myxine from the Gulf of Panama.

No vertical distribution has been recorded with Geotria, Mordacia and Homea. Off the eastern United States *Petromyzon* (*Bathymyzon*) *Bairdii* Gill., was taken by the vessels of the United States Fish Commission at a depth of 547 fathoms; they also took *P. marinus* at a depth of 247 fathoms. *Myxine glutinosa* Linn. was taken by the French Government Steamer "Travailleur" off the coast of Portugal at 251 fathoms, *M. cirrhata* Schleg., was secured by the British Steamer "Challenger" off the coast of Japan at 345 fathoms, and *M. limosa* Gir., was captured off the eastern coasts of the United States by the U. S. Coast Survey Steamer "Blake" at 524 fathoms. The greatest depth yet found for any member of this group is that at which the "Albatross" took the new species described and figured below, 730 fathoms in the Gulf of Panama. Wherever they have been taken there is reason to believe these fishes live at the bottom. The presence of Myxinoids being established at great depths and in very low temperatures it may confidently be expected that future collection will obtain them from all regions inhabited by other deep sea fishes on which they may prey.

In the year 1835 Müller subdivided the group thus:

Nasal duct not penetrating the palate.	*Hyperoartia.*
Nasal duct penetrating the palate.	*Hyperotreta.*

HYPEROARTIA Müller, 1835.

As no representatives of this section of the Myxinia are included in the collection the species belonging to the Hyperoartia are introduced in the list only in connection with the general distribution. Omitting the fresh water forms there are only eight species to be considered.

HYPEROTRETA Müller, 1835.

One branchial aperture on each side of the body.	*Myxinidæ.*
Six or more branchial apertures on each side.	*Homeidæ.*

MYXINIDÆ.

Myxinidæ Bonap., 1845, Specc. Gen., 11.

To the Myxinidæ previously known the "Albatross" collection adds a single new species. For several reasons the addition is of particular interest. It establishes the occurrence of the family nearer the equator and at greater depths than before noted, and it differs from the other species of the genus in possessing a smaller number of gills. In its dentition it approaches Homea, having similar numbers of teeth and the same amounts of confluence in their bases as appear in that genus. Of the species of Myxine its nearest ally apparently is *M. tridentiger* from the Straits of Magellan, or, possibly, a Japanese form, secured by the "Challenger" expedition, heretofore considered identical. Schlegel's *Heptatrema cirrhatum* may or may not belong to Myxine; it is rather suggestive of kinship with species of Homea from New Zealand or the Cape of Good Hope.

As regards the general distribution of the family, the presence of Myxine has been established in the North Sea and connected waters to the Mediterranean (*M. glutinosa*), in the North Atlantic on the western side (*M. limosa*), around the southern end of South America (*M. australis, M. acutifrons,* and *M. tridentiger*), near the equator between the Galapagos and the mainland in the eastern Pacific (*M. circifrons*), and in the Japanese seas (the species obtained by the "Challenger"). Vertically the known range in the North Sea and about the Straits of Magellan hardly extends more than a hundred fathoms from the surface; by the "Challenger" it was carried down to three hundred and forty-five fathoms, off Japan, and by the "Blake" down to five hundred and twenty-four, off the eastern coasts of the United States, and by the "Albatross" still further down to a depth of seven hundred and thirty fathoms in the eastern tropical Pacific. In general the distribution of the marine Myxinia is sufficiently indicated in the list of species given below.

The conclusions reached from the study of the material at hand, mainly that of the "Hassler" expedition, belonging to the Museum of Comparative Zoology, are of a tenor similar to those obtained from the Discoboli and other groups. The Myxinoids are distributed through all the great marine basins; they inhabit the deeper waters of the equatorial regions and both depths and shoals in the higher latitudes; and the species differ in the different localities, similarity of habits and of conditions notwithstanding. Though the species taken by the "Albatross" proves the distribution of the genus under the equator, in the absence of representatives from the Caribbean it gives no very satisfactory evidence in regard to affinities across the isthmus or concerning a former connection between Atlantic and Pacific by way of the Caribbean. In fact its testimony weighs rather against the theory of such a passage in comparatively recent times, since its relationships with species from the Straits of Magellan and from Japan are closer than with those at present known to inhabit the Atlantic. As regards the theory of a bipolar distribution its evidence is entirely negative.

MYXINE.

Myxina Linné, 1754, Mus. Ad. Frid., I, 91.
Myxine Linné, 1758, Systema, ed. 10, I, 650.

For present purposes a complete synonymy of genus and species is unnecessary; a few of the more important items in their history will suffice. The first unquestioned notice of a member of the genus is that of Kalm, 1753, Resa, I, 100, who writes of some peculiarities of a species, likely to have been *M. glutinosa,* under the name of *Pihraol* or *Pilor,* recognizing it as a fish related to Petromyzon. *Myxina glutinosa* was named by Linné, 1754, Mus. Ad. Frid., I, 91, Pl. 8, fig. 4, and was placed among the worms, where it was kept in the tenth and the subsequent editions of the Systema (the orthography of Myxina being changed to Myxine), also in the works of Gmelin and others of his followers. Bloch, 1795, in Part XII. of his great work, p. 67, Plate 413, definitely places the animal among the fishes, but gave it a name of his own, *Gastrobranchus coecus.* His description and figures give a very fair idea of the creature and of its structure. By far the most important works published on the subject are the classic essays of Johannes Müller, 1835 to 1845, which make up his "Vergleichende Anatomie der Myxinoiden, der Cyclostomen mit durchbohrtem Gaumen." Some doubtful information, possibly in part to be referred to Myxine, concerning a fish of the Straits of Magellan was derived from Commerson and published by La Cépède. The matter, however, must always remain conjectural since mucosity, roundness and diameter in an individual do not sufficiently establish either genus or species, and the more important particulars given, the entire absence of fins and an almost cylindrical tail, can be applied to none of the Myxinoids with which we are acquainted at the present time. The following are the particulars noted by La Cépède, 1803, Poiss., V., 652: "Point de nageoires pectorales; point d'apparence d'autres nageoires; le corps et la queue presque cylindriques; la surface de l'animal répandant, en très-grande abondance, une humeur laiteuse et gluante." "*Murænoblenna olivacea.* La couleur générale olivâtre et sans taches; le ventre blanchâtre." "Il parvient à la longueur d'un demi-mètre.

Son diamètre est alors le dix-huitième ou à peu près de sa longueur totale." From Commerson he quotes directly "Conger olivaceo-virens, immaculatus, lac et gluten plurimum fundens." The name *Murænoblenna* was not approved by Rafinesque, 1815, who promptly changed it to *Anopsus*, without adding anything to a knowledge of the object to which the term was to be applied, and which he in the Analyse, page 93, placed in his subfamily *Apteridia* of his family *Ophictia*. On the next page, 94, he credits himself with *Myxine*, and with it and *Gastrobranchus* of Bloch forms his subfamily *Myxinia* of his family *Cyclostomia*.

The specimens on which five of the species characterized below are based are those used by Putnam, 1874, for his Notes on the Myxinoids, where they were arranged as three varieties of a single species. The different types resemble one another so closely, and individual variation is so frequent that determination is a matter of some difficulty. In fact it is only in comparisons of many individuals that the distinctions become really apparent. Even when the averages are quite distinct the species may appear to overlap, through variations occurring in particular cases. In *Myxine glutinosa* the dentition formula most common may be indicated by $\frac{8.8}{8.8}$, eight teeth on each side both above and below, while variations to one more or one less occur in the lower series and less frequently in the upper. *M. limosa* is better shown by the formula $\frac{9.\ 9}{10.10}$, nine in each upper series and ten in each lower, while the most frequent variations add one more to each upper or subtract one from each lower series. *M. acutifrons* has $\frac{8.8}{9.9}$ varied by one more in each upper series or by one less in each of the lower. Either $\frac{10.10}{10.10}$ or $\frac{11.11}{11.11}$ will represent *M. australis*, and the variations include all possible additions and subtractions of a single one from each series between the two formulæ. All of these have the anterior two teeth of each series confluent at their bases. *M. tridentiger* has ten or eleven teeth in each series but differs from the preceding in having the anterior three teeth confluent in their bases. *M. circifrons* has the formula $\frac{13.13}{11.11}$ of which the anterior three of each upper and the anterior two of each lower series are confluent. Again, if the mucous sacs, or the pores, are compared it is found that *M. glutinosa* has not as many in either the pectoral (from head to gill opening) or abdominal series (from gill openings to vent) as *M. limosa*; while *M. australis* is rather close to *M. limosa* but has fewer pectoral and more abdominal pores than *M. acutifrons*. The species may approximately be distinguished by the following:

Anterior 3 teeth confluent in each upper series;	
teeth in upper series 13; gills 5	*circifrons*
teeth in upper series 10–11; gills 6	*tridentiger*
Anterior 2 teeth confluent in each upper series; gills 6;	
teeth in upper series 10 (10–11); pectoral pores 28–32; abdominal pores 63–68	*australis*
teeth in upper series 9 (8–10); pectoral pores 27–30; abdominal pores 62–70	*limosa*
teeth in upper series 9 (8–9); pectoral pores 32–34; abdominal pores 58–59	*acutifrons*
teeth in upper series 8 (7–9); pectoral pores 25–28; abdominal pores 53–57	*glutinosa*

Myxine circifrons sp. n.

Plate LXVIII. figs. 1–4.

Body moderately stout, depth about one eighteenth of the total length, form rather narrow and pointed at the snout, much compressed at the tail. From the head to the gill opening is five sixteenths, and the length of the tail is less than one eighth of the entire length. Labrum, between the anterior narial barbels, broad and rounded, as in *Homea polytrema* Gir. Nasal barbels well developed, upper but little the shorter. Buccal barbels prominent, inner pair short, outer pair strong and longer than the rostral barbels. Teeth in each of the upper series thirteen, the anterior three of which are confluent in their bases; teeth in each of the inner series eleven, the anterior two of which are united by their bases. Gill openings small, at nearly one third of the distance from the snout to the end of the tail. Gills five. In respect to the number of gills this species differs from the others of the genus most prominently. As in those species, the anterior two of the gills lie against the side of the posterior extremity of the massive tongue-muscle. Pectoral pores twenty-one to twenty-three; abdominal pores fifty-nine; caudal pores eleven. Dorsal and anal fins moderately deep, caudal broadly rounded on the posterior margin. Middle of dorsal fin in advance of the vent, the fin rising gradually from the origin and becoming as deep as the muscular portion of the tail in the posterior one third of the latter. Anal as deep as the dorsal. Fin rays, D. 89, A. 42. Muscular segments of the body, pectoral twenty-four, abdominal fifty-nine, caudal eighteen. Abdominal keel prominent in front of the vent.

Largest specimen eighteen and five eighths inches in length.

Body uniform black; head lighter anteriorly.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3395	7° 30′ 36″ N.	78° 39′ W.	730 fathoms	38.5° F.	Rocky.

Myxine tridentiger nom. sp. n.

Myxine australis Günt., 1870, Cat., VIII, 511, — 1887, "Challenger" Fishes, 267.

"Ten or eleven slender teeth in each of the two series, the three foremost are strongest and confluent at the base, the other teeth remaining separate; in the second series the two innermost teeth are confluent at the base. Southern coasts of South America. Sandy Point. Tyssen Islands."

According to Günther this species "occurs also in the Japanese Sea, half a dozen specimens from nine to twenty inches long having been taken on the *Hyalonema* ground at a depth of 345 fathoms (Station 232). I also believe that *Heptatrema cirrhatum* of Schlegel, should be referred to the same species. The three foremost teeth of the inner series are invariably confluent at the base, but in adult specimens they are neither longer nor stouter than the next succeeding. The branchial apertures are subject to some variation, a specimen from Magellan Strait having two on the left side and one on the right."

In the earlier of the works cited Schlegel's species was referred to Bdellostoma (= Homea). The results of comparisons of representatives of the genus from other parts of the world are such as to raise doubts concerning the specific identity of the Japanese species with either of the species of Myxine from other regions.

Myxine australis.

Myxine australis Jenyns, 1842, Voy. "Beagle," Fish, 159.
Myxine affinis Günt., 1870, Cat., VIII, 511.
Myxine glutinosa var. *australis* Put., 1874, Pr. B. N. H. Soc., 135.
Myxine olivacea Jord. & Everm., 1896, Bull. 47 U. S. Mus., 7.

Plate LXVIII. fig. 8.

In the collections of the Museum of Comparative Zoology there are two lots of specimens, obtained by the Hassler Expedition, belonging to this species. One lot was taken at Port Famine, where this was the only species caught; the other was secured at Sandy Point, with the much more abundant species *M. acutifrons.* In the original description *M. australis* is said to appear rather more slender than *M. glutinosa,* hardly differing otherwise unless it be that the tail appears somewhat sharper. The colors are given as those of an earthworm but more leaden on the upper portions, yellowish on the ventral surface, and purplish on the head. The specimens at hand agree with this, before the removal of the slimy covering, but after it has been rubbed off the color is dark brown on the back and white from snout to caudal along the median line of the belly. The white streak sometimes is continued around anal and dorsal fins. In the two forms from Sandy Point the coloration is not greatly different but they are readily distinguished by other features. *M. australis* is the more slender; it has from ten to eleven teeth in each series, the anterior two of each being confluent at their bases; it has eighty to one hundred rays in the dorsal fin, and forty-five to forty-nine rays in the anal; there are twenty-eight to thirty-two pectoral pores, sixty-two to sixty-eight abdominal, and eleven to twelve caudal, on each side; and the labrum is short and blunt or rounded, Pl. LXVIII. fig. 8. Tail slender, nearly one ninth of the entire length. The teeth are more slender and longer than those of *M. acutifrons.*

Port Famine; Sandy Point; Straits of Magellan.

Myxine limosa.

Myxine limosa Girard, 1858, Pr. Phil. Ac., 223.
Myxine glutinosa var. *limosa* Put., 1874, Pr. B. N. H. Soc., 135.

Plate LXVIII. fig. 7.

This species is more slender and has a greater number of teeth and a larger number of pores than *M. glutinosa.* The narial barbels are short and about equal in length; the labrum is short, blunt and rounded, resembling a small papilla or tubercle more than a barbel. The most common formula of the teeth has nine in each upper series, sometimes ten, rarely eight, and ten or nine in each lower, the anterior two of each series being confluent in their bases. On one specimen the dorsal has one hundred and twenty-four rays, on another one hundred and six. The number of rays in the anal fin ranges from forty-nine to fifty-four. There are from twenty-seven to thirty-one pectoral pores, from sixty-two to seventy abdominal, and from eleven to thirteen caudal pores, on each side. Abdominal keel prominent.

The color is dark brown to blackish, leaden on the mucous covering, lighter on the ventral surface.

The specimen described by Girard was from Grand Manan; many of the specimens at hand were obtained in the same locality. A specimen was taken by the "Blake" in Lat. 41° 32′ 50″ N., Lon. 65° 55′ W. at a depth of 524 fathoms, and another off the coast of North Carolina, in Lat. 34° N., at a depth of 178 fathoms. Those from Grand Manan were taken from the mud at 30 fathoms. Another locality is Eastport, Maine.

Myxine acutifrons sp. n.

Plate LXVIII. fig. 6.

The shape in this species is similar to that of *M. australis* Jen. but is a little less slender; the coloration is nearly the same. The abdominal pores are less numerous; there are not so many teeth in each series; and the labrum is acute and resembles one of the barbels to some extent. Commonly there are eight teeth in the outer series, sometimes seven or nine, and nine, sometimes eight, in the inner; all are shorter and stouter than those of *M. australis.* The bases of the anterior two of each series are confluent. Dorsal origin little forward of the vent; dorsal rays eighty-one to ninety-three. Anal, like the dorsal, deeper backward, with forty-five to forty-six rays. Tail compressed, posterior margin a broad curve. Pectoral pores thirty-two to thirty-four, abdominal fifty-eight to fifty-nine, and caudal eleven to thirteen, on each side.

On the upper portions the color is dark brown, more or less leaden on the mucous covering; on the ventral surface it is lighter, especially so in young.

From the collections it would appear that this species was much more abundant than *M. australis* at Sandy Point, Straits of Magellan; at Puerto Bueno again it was abundant and the only species taken; while at Port Famine this species was not obtained but *M. australis* was particularly abundant. The localities mentioned are not very widely separated.

Myxine glutinosa.

Myxina glutinosa Linné, 1754, Mus. Ad. Fridr., I, 91, Pl. 8, fig. 4.
Myxine glutinosa Linn., 1758, Systema, ed. 10, I, 650.
Gastrobranchus coecus Bloch, 1795, Ausl. Fische, IX, 67, Pl. 413.

Plate LXVIII. fig. 5.

A smaller number of teeth and a smaller number of pores distinguish this species from the others. The form is comparatively stout, and the labrum is short, blunt, and rounded. In the upper series there are most often eight teeth in each (sometimes seven or nine in one series or the other), and in the inner series there are either eight or nine (sometimes ten). The anterior two of each series are usually confluent in their bases. The pectoral pores vary from twenty-five to twenty-eight, the abdominal from fifty-three to fifty-seven, and the caudal from eleven to thirteen. A specimen at hand has eighty-eight dorsal and fifty-three anal rays.

The color is dark brown to brownish, with more or less of leaden, when freshly placed in alcohol, and varies in regard to the amount of light color along the abdominal fold and the fins.

The specimens examined have the localities Denmark, Norway, Great Britain, Liverpool, Europe, and three of them, purchased from C. L. Salmin, are labelled "Triest." These last tend to establish Bloch's conclusion regarding the presence of Myxine in the Mediterranean, based on Aristotle's statement in respect to Pholis (Hist. Anim., Book IX. chap. 25), a conclusion afterward discredited by Johannes Müller. "The mucous substance which the pholis emits forms around it, and resembles a chamber" is a statement that is sure to recall that of Kalm concerning the behavior of a living *M. glutinosa* when placed in a vessel of water. This species, according to Vaillant, was taken by the "Travailleur" off the coast of Portugal at a depth of 251 fathoms.

HOMEIDÆ.

Bdellostomidæ Gill, 1872, Arr. Fam. Fishes, 25.
Bdellostomatidæ J. G., 1882, Bull. 16, U. S. Mus., 967.
Heptatremidæ Gill, 1894, Mem. Amer. Acad., VI, 129.

This family is so closely allied to the Myxinidæ as hardly to be entitled to a rank higher than that of a subfamily; the numbers of gills and of gill apertures, six or more of each, are the principal distinguishing features.

Homea the typical genus (*Bdellostoma* of Müller, 1834) was based on a species, taken by Banks in the South Seas and noted by Home in 1815, to which the generic and specific names *Homea Banksii* were applied in 1822. Species of this genus, *Gastrobranche Dombey* LaC. and *Petromyzon cirrhatus* B. S. were placed by Cuvier, 1829, in "Les *Heptatrèmes* Dumér." In 1831 Bonaparte made "*Heptatremus* Dumér." a synonym for Myxine, and in 1832 Voigt translated Cuvier's terms into "*Heptatrema* Duméril," including the species originally assigned. Johannes Müller, 1834, renamed the genus *Bdellostoma* and made it to contain the species placed in it by Cuvier with several others since reduced to the synonymy. Girard's statement that the name *Heptatrema* was given by Duméril in 1806 is without warrant; the generic names then applied were "*Lamproie*" and "*Gastrobranche*," the Latin terms *Petromyzon* and *Gastrobranchus* were placed after these in parentheses in 1812, when *Ammocœtus* was added as another genus. Unless it can be shown that there was use of the name *Heptatrema* previous to 1822 it will have to give way to *Homea*. That *Bdellostoma* was a synonym was known to Müller is evident from his references. The family name *Bdellostomidæ* 1872, was discarded by its author for *Heptatremidæ*, 1894; both, being based on synonyms, will have to be dropped for *Homeidæ*. Crediting the family name *Myxinidæ* to Rafinesque, 1810, is probably due to mistake possibly based on that author's "LXXI. Ordine *I. Missinidi*," which being without contents is only an empty name. Rafinesque's subfamily *Myxinia* of his family *Cyclostomia* dates from 1815, the name *Myxinidæ* dates from 1845. The family was well established by Müller 1835 (1834) under the name *Myxinoidea* and included both *Myxinidæ* and *Homeidæ*.

HOMEA.

Homea Fleming, 1822, Phil. Zool., II, 374.
Heptatrema Voigt, 1832, Das Thierreich, II, 529.
Bdellostoma Müll., 1834, Abh. Ak. Wiss. Berl., and 1835, Anat. Myx.

The history of this genus begins with the article in the Philosophical Transactions for 1815, in which Home records a number of particulars concerning a specimen obtained by Banks, page 258, Tab. XII. fig. 1. The species is identified by Günther and others with that described by Bloch and Schneider, 1801, from manuscript by Forster, under the name of *Petromyzon cirrhatus*. The name *Homea Banksii* was applied to it by Fleming,

1822. That there may be less doubt about the matter in the absence of the works cited, Fleming's remarks and those he quotes from Home are given entire.

"HOMEA. Margin of the mouth bearded.

"I have ventured to name this genus in honor of Sir Everard Home, who has so successfully investigated the aërating and reproductive organs of the tribe to which it belongs, and who has pointed out its distinguishing internal characters. The trivial name is due to the late illustrious Banks, by whom the species was brought to this country from the South Seas. *H. Banksii.*"

"In an animal brought from the South Seas by Sir JOSEPH BANKS, intermediate between the lamprey and myxine, but differing so much from both as to form a distinct genus, the respiratory organs resemble those of the lamprey in the number of the external openings, and the number of bags; but these organs, and many other parts differ in the following particulars, in which they agree with those of the myxine. There is no appearance, whatever, of thorax, nor is the pericardium cartilaginous; the bags are flattened spheres placed perpendicularly, their cavities are small, their coats elastic, and the internal orifices communicate directly with the æsophagus, which is small. The æsophagus does not terminate in a valvular slit, but in a loose membranous fold; there are two rows of teeth on each side of the tongue, bent downwards, long and pointed. There is a posterior nostril, and an appearance resembling an uvula. There is a gall bladder, a row of large mucous glands on each side of the belly, and there is a mesentery to the intestine." See Home, 1815, Phil. Trans., p. 258, Tab. XII. fig. 1.

Homea cirrhata.

Petromyzon cirrhatus Bl. Sch., 1801, Syst. Ichth., 532.
Homea Banksii Flem., 1822, Phil. Zool., II, 375.
Bdellostoma hexatrema Müll., 1834, Abh. Ak. Wiss. Berl., 79.
B. heterotrema Müll., 1834, l. c., 79.
B. heptatrema Müll., 1834, l. c., 79.
B. Forsteri Müll., 1834, l. c., 80, and 1838, 171.
B. cirrhatum Günt., 1870, Cat., VIII, 511.

THE LATERAL CANAL SYSTEM.

Plate LXIX.–LXXXIV.; XXXIV. figs. 1–5; XXXV. fig. 4; XXXVIII. figs. 2, 3, and 7; XXXIX. fig. 2; XLI. figs. 1a, 2a.

In Volume XVII. No. 2, 1888, of the Bulletin of the Museum of Comparative Zoology the writer traced and described the "Lateral Canal System" of many of the rays, sharks and chimæras, with numerous illustrations, pointed out the connections between the canals of the upper and those of the lower surfaces, and adopted a nomenclature which is still found to be better adapted for comparisons than other systems of names more recently advocated. The terms applied in that publication with slight modifications are those used herein. It is not the purpose to repeat the descriptions, but it may be stated in a few words that on most Selachians and Chimærans the Lateral Canal System consists of a tube or groove, more or less branching, in which nerve endings apparently of tactile functions are distributed. The tubes contain mucus and communicate with the water outside by means of openings rather closely corresponding in number and position with the ends of the nerves within. The mucus found in the tubes is no very essential part of the system, since so many forms have the papillæ in which the nerves end exposed without inclosure in a tube or channel. Sometimes the tube or groove is found to have become obsolete; in such cases the ends of the nerves may appear in small isolated papillæ commonly in slight depressions on the skin, or they may be inclosed in cysts, remnants of the tubes, as in the so-called "Vesicles of Savi" (see Lat. Canal Syst. pp. 60 and 94, Plates XXXIV. and XXXV. fig. 2), where they may possibly have suffered some change in function.

That the system was primarily confined to the head is evident from the course of its development in the embryo; and that it was twofold, that is, distinct on each side of the head, is sufficiently evident from the innervation, from the common lack of an aural connection across the top of the head on bony fishes, and from occasional reversions to the lack of an aural on various Selachians, for instances *Centroscyllium nigrum* Plate LXIX. fig. 1, below, or on *Heptabranchias maculatus,* Lat. Canal Syst., Plate XIV. fig. 2.

For confirmatory instances on bony fishes see Plates LXXI. to LXXXIV. of the present work, which represent forms on which the aurals are not connecting and on which subcephalic connections between the system on the two sides of the head are generally absent. The facts that the neuration of the system on each side of the body proceeds from its own side of the brain developing from near the brain to the farther portions in the early stages, and that oral, jugular, and, in bony fishes, aural connections are somewhat rare, indicate rather conclusively that on ancestors of the fish-like vertebrates the lateral system was in two parts, one on each side of the middle of the head and the body. Exceptional instances of transverse connections in the system are to be seen in the Chimærans, Lat. Canal Syst. Plates III. and IV. figs. 2 and 3, where the canals are highly differentiated, also on the greatly specialized Halieutoids on which the oral is continuous from one side to the other, Plates XVIII. to XXV. below, and on Chaunax, Plate LXXIII. fig. 1, which apparently has a transverse submental series of nerve papillæ.

So far as the Plagiostomes are concerned the intention at this writing is merely to compare the system in the several species figured on Plates LXIX. and LXX. The distribution of the canals on *Centroscyllium nigrum*, Plate LXIX. fig. 1, and on *Isistius brasiliensis*, Plate LXIX. fig. 2, approaches that of the simplest arrangement obtaining among the sharks (Antacea). Excepting in regard to slight differences in directions and curvatures the canals of the mentioned species are similar to one another, with the further exception perhaps of the division of the aural (*au*) on Centroscyllium, a division which may or may not be a peculiarity of the individual corresponding to that noticed above as occurring on *Heptabranchias maculatus*. In both Centroscyllium and Isistius the median (*m*) is short and longitudinal, but on Isistius oral (*o*) and angular (*ang*) are more elongate than on the other. Neither of them possesses a jugular (*j*), a gular (*g*), nor a spiracular (*sp*), as seen on *Chlamydoselachus anguineus*, Plate LXX., which see for the lettering. On the last mentioned the system was originally traced as indicated by the outer openings of the tubules leading from the tubes (Lat. Canal Syst., Plate XV.); on specimens obtained subsequently the canals themselves have been followed and sketched, Plate LXX., with a result corresponding nearly to the arrangement in the diagram first published. The median canal (*m*) proved to be transverse, in this particular agreeing with *Prionodon Milberti* M. H. and with *Alopias vulpes* Gmel. The functions of the system in Plagiostomes does not appear to have been changed to any extent by deep sea conditions.

Among the bony fishes the history of the system is somewhat different. The arrangement of the canals differs from that on the typical Plagiostome to some extent, as is amply shown in the subjoined illustrations. The separation of the canals of the right side from those of the left is more general and the presence of a spiracular canal on the operculum behind the postorbital and usually connected with the oral is a common feature. This opercular canal corresponds with the spiracular (*sp*) of Chlamydoselachus, Plate LXX. In many if not most it is apparently separate from the main longitudinal canal at the side of the skull. Along the side of each mandible there is a canal which is identified with the oral (*o*) of the typical Galei (Antacea). An aural connection across the crown between the right side and the left may have existed in numerous cases; if so it has to a greater or less degree become obsolete. A submental connection between the two orals, as on Chaunax, Plate LXXIII. fig. 1, appears to be exceptional. Accepting as typical the presence of both spiracular and postorbital, as seen on Lamprogrammus, Plate LXXXI. fig. 1, and on the majority of the figures on Plates LXXII. to LXXXIV., anomalous developments are to be noted on the more specialized forms, such as the changes brought about by a shortening of the head behind the eyes, as seen on the Scorpænoid figured on Plate LXXI. fig. 1, on which the spiracular and the postorbital canals have fused (see Chaunax also, Pl. LXXIII.), or on the Cottoid of the same Plate, fig. 2, on which the spiracular joins the orbital, forming a plan intermediate between that of the Scorpænoid, fig. 1, and that of the Berycoid, fig. 4, of the same plate. Whether the aural branches are primarily to be regarded as a loop, as on Lamprogrammus, Plate LXXXI. fig. 1, leaving the main canal opposite the parietal region and joining that canal again forward of the junction of the postorbital is an open question. Possibly the aural branches cross the head in some highly differentiated forms, like the Scorpænoid and the Cottoid cited above, while on others, as Lamprogrammus, Plate LXXXI. fig. 1, the loop represents simply another phase of differentiation. Owing to the amount of maceration the specimens have suffered it is difficult in many cases to trace the minute connecting thread running from disk to disk in the canals; for this reason in a number of the figures of specimens on which it was nearly or quite invisible no attempt has been made to place it; its course can safely be supplied from the positions of the fusiform glandular disks at the outer extremities of the nerves.

An apparent departure from the common arrangement is that on *Halosaurus radiatus*, Plate LXXXIV. figs. 3 and 5, but the difference is in the details rather than in the general plan, for though cranials, aurals, postorbitals and spiraculars are perhaps without the glandular organs the canals are present and the minute nerve endings no doubt have their ordinary tactile functions. The most divergent feature in the system in this case lies in the backward extension of the oral in a short series of glands, similar to what obtains on Chaunax and corresponding to the canal on the Antacea known as the jugular, Plate LXX. *j*. On Halosaurus there is a further variation under the snout; and on Chaunax while the aural appears to be rudimentary there is an apparent connection between the rostral canals across the snout, the orbital is produced backward on the cheek to the spiracular, the latter is continued downward to the posterior extension of the oral which is continued still farther back toward the base of the pectoral, there are two connections between the orbital and the oral, the anterior being the angular (*ang*), and there is no postorbital. If it were not for the position of the vertical series on the cheek of Chaunax, so far backward from the orbit and behind the angular, it might be taken for the postorbital while the jugular extension would answer for the spiracular.

In addition to the variations in the Lateral Canal System resulting from changes in the structure of parts of the fishes' bodies adjacent to it there are others, consequents of changes in function; as on *Phycis regius*, Plate LXXXI. fig. 2, on which the system in the hinder portion of the cranial region has become rudimentary, probably on account of the acquisition by the species of an electric faculty. In this species the canals on the top of the head backward of the orbital are all affected by the change, and the origin of the shocks given by this fish may perhaps be traced to the aural portion of the head. Halosaurus also is a pertinent instance, since the system on the upper half of the head, where the nerve papillæ (disks) are insignificant in size or invisible, apparently has the ordinary function of that on the head and body of a fish of the shoals, while in the canals of the lower half of the head the glandular organs are highly differentiated and evidently have taken on the office of luminous bodies and of flash lights.

One of the most obvious modifications obtaining on bathybial fishes is that taking place in the organs at the ends of the nerves of the Lateral

Canal System. From the simple "nerve papilla" there are all degrees of complexity leading up to the intricate structures possessed by Leucicorus or by Mixonus, Plates XXXVIII. fig. 7, and XXXIX. fig. 2. On deep sea species each papilla has enlarged and instead of being a minute rounded fleshy tubercle has become, as told from alcoholic specimens, an organ of considerable size in which there is a central yellowish opaque rounded body, corresponding to the papilla, surrounded by a whitish translucent fusiform portion situated transversely in the canals of the system and enveloped in a rounded or longitudinally elliptical mass or corona resembling thickened mucus; the structures together forming a prominent convex body, which for present convenience may be called a disk, partially obstructing the canals, which latter are filled with a thin mucus in contact with the sea water through pores or openings, commonly seen at the lower edge of the canal, one of them near each of the glandular disks. In many cases the minute pores of the shoal water species have given place to apertures of comparatively large dimensions (see figures on Plates XXVII., XXVIII., and XXXI.). Plates LXXI. to LXXXIV. indicate somewhat closely the various degrees of enlargement in the disks, since the different sketches maintain the proportions with regard to the size of the head as nearly as possible. On fresh specimens no doubt an enveloping mucus is present; from the material in hand it has entirely disappeared. The sketches most often show only the outlines of the fusiform and the included central body (centrum), to which is added in many cases the slender threadlike connection between the disks.

Comparing these organs great variations in sizes appear in the different species and genera. In a general view the size of the disk is greater in species of the greater depth where more dependence is placed on the system; most often also, like the eye, the disk is of a greater comparative size in the young, which in all probability place more reliance upon it, than in the adult, in which strength swiftness or armature are more efficient. On young of some species the disks are very distinct while on the adult of the same species they can be detected only with considerable difficulty. Though it is true that the system attains its greater development in the greatest depths, it is not at all accurate to say that it increases in prominence and complexity in all the species. For those possessing extensive developments of other sensory organs, as species of Dicrolene, Pteroidonus, and Bathypteroïs with their greatly enlarged tactile fin rays, have rather small disks as compared with those of Bassozetus, Eretmichthys and Lamprogrammus, which lack the extraordinary filamentary productions and on which the Lateral System is evidently of much greater functional importance and development. This will be made evident beyond the need of further remark by contrasting Plates F and LXXV. of Dicrolene, and fig. 1 of Plate K, and Plate LV. of Bathypteroïs, with Plate XXXIV. and fig. 1 of Plate LXXXI. of Lamprogrammus, Plates XXXV. and LXXIX. of Eretmichthys, and Plate LXXVII. of Bassozetus. Another instance that may be noted is that of Leucicorus, Plates XXXVIII. and LXXIV. fig. 1, a fish without filamentary organs, and with few prominently developed sensory papillæ, and one on which the eyes, probably functional early in life, are liable to deterioration in older individuals; on this fish the organs of the Lateral System attain a maximum size and a paramount differentiation.

There appears to be no connection between one disk and another, possibly it is invisible, on many species but on the more differentiated a very evident thread-like connection exists, Plate XLI. figs. 1ª and 2ª, and on some of them the more common nerve-like thread is accompanied in its course by a considerable number of minute nerves, Plates XXXVIII. fig. 7, and XXXIX. fig. 2. Plates XXXIV. figs. 4 and 5 and XLI. figs. 1ª and 2ª represent the more common appearance of the disks on forms in which the development has not been carried to such an extraordinary degree. A transitory connection between the disks in certain embryos is mentioned by Allis.

The main nerve to each disk extends to the back, that is to the inner side of the central body and there sends out a number of small branches, varying for different disks, individuals and species; these branches distribute themselves irregularly through the rounded or oblong centrum, and from it into the lateral portions of the fusiform mass upon which it is situated. An approximate idea of the manner of the distribution within the fusiform transverse body and the included centrum may be gained from fig. 4 on Plate XXXV. In this case, Eretmichthys, the number of nervules leaving the centrum is comparatively small; it represents an intermediate between those cases in which none are to be observed and those like figure 7, of Plate XXXVIII., in which there are many. From the anterior and the posterior edges of the fusiform mass, in some species at least, the nervules pass into other masses, one mass at each side of the fusiform. The latter give to the disk in its entirety a longitudinally oblong shape, Plate XXXVIII. figs. 7 and 3, and Plate XXXIX. fig. 2. Whatever they may have been in life these portions of the organ are more opaque and whitish than the fusiform, though still to some extent translucent. Immediately on passing from the fusiform into these masses the nervules dissect into a multitude of very fine branchlets, so fine and so numerous indeed that the masses, on Leucicorus and Mixonus, appear to be quite filled with them. Different genera exhibit few or none of the nervules outside of the fusiform or even, in many, outside of the centrum. Immediately on passing from the fusiform mass into the outer masses, in the genera just mentioned, the nervules divide into finer threads, but on nearing the opposite edges they again unite to form larger branches some of which pass inward to meet nerves going to the brain and others of which accompany the minute connecting thread to enter similar masses in the next organs. Toward the left hand end of fig. 2 of Plate XXXIX. below the pectoral fin of fig. 1 of the same plate, an attempt is made to depict both the inner nerve, supplying the branches for the centrum, and the outer, gathering up some of the nervules and completing the circuit. Between the two disks drawn in this figure the branchlets have not joined into a single nerve, but they traverse the distance as distinct nervules which branch again on reaching the next organ. As may be seen from this figure there is much difference in the conditions of the nerves between the organs of various directly connected pairs; sometimes the nervules are numerous, but in the nearest interspace again they may be very few.

Generally the cephalic organs of the lateral system receive their nerves from the trigeminal and the facial groups, and to a less extent from the glossopharyngeal, and those of the body depend upon the vagus. Within certain limits the main features of the innervation are similar in the different families noted below, but beyond these limits among the details there are considerable divergences. This is shown by comparison of the nerves of individuals of the same species, *Bassozetus nasus*, in figs. 1 and 3 of Plate LXXVIII. On figs. 1 and 2 of this plate the nerve has been traced back from each disk to the brain. These figures give an approximate idea of the condition, in all of the main features, in all of the teleosts here dwelt with. By comparison with *Amia calva* it will be seen that there is a rather close correspondence in the principal features of the innervation. A feature of special interest in a contrast with these figures is the fact that Amia exhibits an arrangement of the system that in respect to aural and supraorbital branches of the cranial canal is intermediate between that of the Scorpænoid, or the Cottoid, of Plate LXXI. fig. 1, or figs. 2 and 3, on which the aural branches unite on the occiput, and the majority of the other types figured below which possess disunited aurals and a frontal cranial branch that tends toward the formation of a loop, as on Lamprogrammus, Plate XXXIV. fig. 3, and Plate LXXXI. fig. 1. Amia has the occipital commissure of the aural branches; it also possesses the frontal branch backward from the cranial toward the aural. For the arrangement and innervation of the system on Amia see the work of Allis, 1889, fig. 49. On the body of the teleostean the system varies from the complete, extending along the body from head to tail, to partial or entire absence, to interrupted series, or to several duplicate rows, and from lines of simple nerve papillæ to those of excessively modified disks, and the drafts upon the vagus vary accordingly.

Turning attention especially to the cephalic organs a large amount of variation in the numbers of disks will be at once apparent; on the species sketched the range is from fifty disks up to ninety. Further than this, many species have disks of different sizes or of different degrees of development on different parts of the head. This diversity is a consequent of particular habits; species on which the function of the disks is equally important in all directions have the organs about equally developed on the top of the head on the sides and beneath, as Mixonus, Porogadus, Bassogigas, and Catætyx of Plates LXXIV., LXXVI., and LXXX.; but others on which the function upward accords better with the habits have large disks on the upper parts of the head and small ones on the lower, as *Bassozetus nasus*, Plate LXXVII. and species of Eretmichthys, Plate LXXIX.; and still others as the Halosauroids, Plate LXXXIV. fig. 1, find a function downward more satisfying to their necessities and possess disks of extraordinary development on the lower portions of the head and the body while those of the upper parts have suffered from neglect. Some of the species have the disks hidden by darkly pigmented mantles from all directions except below; this is particularly the case on species of the subgenus Halosauropsis. A wide range of perfection in the system is to be seen on the species of Halosaurus: on forms like *H. attenuatus*, Plate LX. fig. 1, the disks and their envelopes are so thin as to be almost invisible and so delicately attached to the surfaces of the scales as to be carried away by a very slight rub; on *H. radiatus* Plate LX. fig. 2, a much greater degree of advancement obtains; and on *H. macrochir* and *H. rostratus* the mechanism appears to have reached the extreme of differentiation. On these last the disks and the particular scale on which each is seated are much enlarged and the dark mantle by which they are covered effectually directs the function downward through the opening at the lower edges. In some types the scale on which the disk is borne has become so enlarged as to lose its position and identity with others about it and to appear as if a superficial and accessory acquisition. There are such acquisitions outside of the disks, however, on Lamprogrammus. On the body of *Phycis regius* and on the top of the head of Halosauri the system appears to be more primitive in character than on other portions of the body.

If in its inception the Lateral Canal System was tactile in function there is no evident reason why, in the complete darkness of the abysses, more than ever before demanding its exercise, this function should deteriorate or be lost; but instead all the circumstances would appear conducive to its enhancement and perfection. Unless something better has been substituted for it, it is likely that the tactile function has been retained in the lateral systems of all of the bathybial fishes. That the additional and very complex apparatus present on some species is to subserve the same purpose and nothing more is not so likely. Structure, pigmentation of adjacent tissue, apparatus for hiding effects or for controlling their directions, considered in connection with the absence or the presence of the eyes and their development, the character of the bathybial light and the probability of incursions into profound darkness all tend to make the conclusion unavoidable that the tactile organs of the lateral system have in the great depths become luminous organs also, and that on many species they are so controlled by their possessors as to answer the purposes of flash organs. Again, the possession of apparatus in the disks beyond the needs of mere light organs, by blind as well as by eyed forms, indicates that there is yet more than the tactile and the luminous to be accounted for; and in these cases we are apparently driven to conclude that electric functions exist, functions by means of which the species or the sex of the individual is recognized, the members of the school are kept together, and by means of which the prey is captured and the enemy is avoided. A probable addition to the functions of the lateral system is the sense of taste; the sense of smell is otherwise provided for in well developed olfactories.

In the Bulletin of the Museum of Comparative Zoology, 1888, Vol. XVII. p. 72, an attempt at the use of the lateral system in classification was made by the writer. In this essay special stress was laid upon the arrangement, connections, branching, etc., for the separation of species, genera and higher groups. Collinge and others also have made attempts in similar directions placing the stress mainly upon the innervation. Though the distribution of the nerves can be used to advantage in connection with the higher divisions, in an approach to the species and varieties it becomes less practical than the more obvious features, the arrangement and special characters of the system itself. It is in the numbers of the disks, their distribution, and the comparative sizes and degrees of development that the most effective aids to classification are available; it is by means of these that most light is shed upon the closer and more recent affinities among deep sea fishes.

In the following notes attention is directed to a few of the more obvious special features of each of twenty-six species of Teleosts from which outlines of the cephalic portions of the system are presented.

Ectreposebastes imus, *Cottunculus Thomsonii*, and *Hoplostethus pacificus* of Plate LXXI. illustrate three types of the canals on the cheek behind the eye: in the first the orbital and the spiracular are reduced to a single canal, in the third they are distinct though tolerably close together, and in the second they appear to be partially reduced. The aural branches of the first and the second are transverse though they may not unite across the occiput, but on the third they evidently unite with the frontal branches of the cranials and form a loop, as in Lamprogrammus. The disks are small and nearly uniform in size in each case; they are more developed than those of the shoalwater allies; on the head *E. imus* has 52, *C. Thomsonii* has 56, and *H. pacificus* has 70.

Caulolepis subulidens and *Melamphaës nigrofulvus*, Plate LXXII., though differing in details, show considerable evidence of relationship. The postorbital and spiracular branches of the canals are distinct; the frontal branches and the aurals are similar, but the latter bear two disks on Melamphaës and only one on Caulolepis. The probability is in favor of an aural commissure on the occiput on both forms, and it may be the frontal branches are connected with the aurals; these connections have not yet been made out. The disks of Caulolepis appear to be rather more complex than those of Melamphaës; *C. subulidens* has 72 disks on the head and *M. nigrofulvus* has 68.

Chaunax coloratus and *Lepophidium emmelas*, Plate LXXIII., possess very different developments of the lateral system. The first represents the pediculates; it shows postorbital and spiracular as a single series, the spiracular from its position, and there appears to be an angular and a jugular connection between the orbital and the oral; there is a short series like a rudimentary spiracular back toward the gill opening, a transverse series between the rostrals on the top of the snout, and another transverse series between the orals on the chin; the aural and the frontal branch appear to have formed a very short loop on each side of the occiput; each disk rests upon a peculiar transverse boat-shaped scale of which each end forms a spine or tubercle to protect the organ; and there are 90 cephalic disks. The second species is of a more common type; the disks are moderate in size, of a nearly uniform development; there are 66 disks on the head; there is a short aural branch of two disks on each side; and the cranial gives no sign of a frontal branch.

Leucicorus lusciosus and *Mixonus caudalis*, Plate LXXIV., are closely allied forms, on which the disks are greatly differentiated, postorbitals and spiraculars are distinct, a short aural passes up and forward as if to form an occipital commissure, and frontal branches are absent. The blinded species, *L. lusciosus* has 58 cephalic disks, the other, *M. caudalis*, has 62.

Dicrolene nigra and *Dicrolene filamentosa*, Plate LXXV., illustrate the most available differences for the formation of the minor divisions of the genera, for instances slight variations in the groupings of the disks on postorbitals and spiraculars, in the interspaces, in the curves of the series, and in the sizes of the disks. Aural and frontal branches are similar in the number of disks, but differ slightly in directions; the number of disks on the head is 64 in each species.

In *Porogadus longiceps* and *Holcomycteronus digittatus*, Plate LXXVI., a long-headed species of one genus is contrasted with a short-headed species of another genus. The disks differ in size on the two species, but are uniformly developed on each; neither has frontal branches. On the first the disks are small, farther apart, there are 68 on the head, the series are straighter, and the aural branches contain but two disks each. On the second species greater dependence is evidently placed on the system; the disks are much larger; the series are more curved; there are three disks in each aural branch; and there are 64, probably 66, disks on the head.

Bassozetus nasus, Plates LXXVII. and LXXVIII., is a good exemplification of the consequences to the system of function in special directions from the body, due to particular habits. The disks have an extraordinary development on the upper portions of the head, while on the lower portions they are comparatively small. The disks of greatest development are those placed so as to bring their functional field most completely within the field of vision, a fact which strongly supports the theory of luminous disks on certain species. Those disks out of the visual field, or better those functioning toward points not reached at the same instant by the eye are less developed. Thus it happens that the disks on the forward portion of the snout and those back of the head at the angle of the gill opening are smaller than those nearer the eye, while, being in better position, they are larger than those below the lower jaws. Similar statements may be made concerning the species of Eretmichthys. On the head of *B. nasus* there are 58 disks.

Eretmichthys pinnatus and *E. ocella*, Plate LXXIX., resemble *Bassozetus nasus* in regard to differences in the developement of the disks on different parts of the head; neither of them has frontal branches and each has two disks in each aural branch. These forms are readily separated by details of the system, though the pectoral oars of *E. pinnatus* and the pores on the head of *E. ocella* render it hardly necessary to go below the surface for aid. *E. pinnatus* has 54 cephalic disks and *E. ocella* has 56.

Bassogigas stelliferoides and *Catætyx simus*, Plate LXXX., belong to very distinct genera. The most prominent differences in the systems, besides that in the number of disks, are perhaps those due to the elongation and the depression of the head in Catætyx: the disks are far apart in the longitudinal canals and close together in the vertical, that is, in the postorbital and the spiracular. In both species the disks are comparatively small and are of nearly uniform size on all parts of the head; both are without frontal branches. *B. stelliferoides* has 64 cephalic disks, two of them in each aural branch, and *C. simus* has 50 disks on the head, but one of which appears in each aural.

Lamprogrammus illustris and *Phycis regius*, Plate LXXXI., present differences of the most marked character. The disks of the first are large but very slender aud spindle-shaped; the series are complete; and, a feature not yet noted on others, the frontal branches have joined the aurals forming a complete loop, which, however, contains but three disks, the one ordinarily found in each frontal branch and the two most often occurring in each aural. There are 56 cephalic disks; those of the body are similar to those of the head. On *Phycis regius* the disks about the eyes are the better developed; those on the aural region are rudimentary and obsolescent, their places being occupied by a cavity of some size, filled with a gelatinous mass and mucus, into which canals are carried as hard-walled tubes, one of which, indicated in the sketch, is continuous with the lateral line of the body and another apparently with the cranial canal of the head; and no disks appear to be developed on the body.

Merluccius angustimanus and *Phyciculus rastrelliger*, Plate LXXXII., are diverse forms which probably are not well placed in the same family. Both are Gadoids but *M. angustimanus* exhibits a lateral system that differs considerably from that of its nearest allies in the Gadidæ. Compared with them the arrangement is similar, there are no frontal branches of the cranial, and there are two disks in each aural, but it is in peculiarities of the disk that the differences appear. Each disk is a broad band-like mass of tissue on which there is a thin yellowish cover apparently granulated on the surface and thicker in the middle, between the ends of the connecting threads, in the position of the centrum. The centrum is not well differentiated, though the glandular mass, in greater depth at this point, probably answers its purpose; the fusiform portion of the disk was not to be detected. The linings of the canals are pigmented, which with the lack of concentration of the glandular tissue in a centrum may indicate differences in function. There are 54 cephalic disks. The disks of *P. rastrelliger* are like those of other Gadidæ; they are small, nearly uniform in size over the head, and each aural, with two disks, turns sharply forward. The specimen possessed 66 disks on the head.

Microlepidium grandiceps and *Macrurus anguliceps*, Plate LXXXIII. represent allied families which differ in regard to the amount of dependence placed on the lateral system. *M. grandiceps* of the Gadidæ was taken at the greater depth, 1421 fathoms, but has less development in the disks, which are small, and nearly uniform in size. Postorbital and spiracular series are brought rather close together in this species; no frontal branches were discovered; there are two disks in each aural branch and 62 in the entire cephalic portion of the system. In *Macrurus anguliceps* it is evident that the function of the system is of more importance; it has attained a much higher degree of development, though the species was taken at a less depth, 1067 fathoms. The minute disks in the frontal region illustrate the manner in which as some of the disks increase in size their number is reduced, some of them growing larger, others gradually disappearing. Including the obsolescent, there are 72 disks on the head of this species. On one of the species on this plate the eye appears to be developed far beyond the system; on the other, eye and system are about equally important.

Macrurus canus and *Halosaurus radiatus*, Plate LXXXIV., exemplify very diverse forms, dwelling at the bottom, secured from moderate depths. Compared with *M. anguliceps*, *M. canus*, from 210 fathoms, has a larger eye and a somewhat smaller degree of development in the disks of the oral series, and the frontal disks are quite as well developed as any of the others. This species is an intermediate between Macrurus and Trachyrhynchus; there are 68 cephalic disks. On Halosaurus the relative positions of the disks (which are no doubt lanterns and flash lights) and the eyes are much like that of a dark lantern and an observer who keeps himself out of sight in the shadow while throwing the light upon objects around him. On some species the disks are covered by screens which prevent escape of the light in other directions than downward away from the body. On the upper surfaces of the head the disks are comparatively few, are much less developed, and are not apparent in the cranials backward of the orbital branches. Backward of this point the cranials and the aural branches, which latter unite on the occiput, are hard-walled tubes and much more primitive in character; but on the body the greatly differentiated disks reappear, closely underlaid by the especially large branch of the vagus by which they are innervated. In the figures this nerve would appear to be forward of the pectorals; in reality it passes above and down immediately behind them.

ON THE DISTRIBUTION OF THE GENERA.

When dealing with species it was possible to divide the collection approximately into two groups, one of which contained the deep sea forms, the other those from the shoals or near the surface, but such a division of the genera is not practicable, owing to the great majority of the deep sea types themselves being congeneric with species only represented in the upper waters. While the closest affinities are necessarily to be determined by comparisons of particular species or of varieties of particular species, rather than of genera in their entirety, considerations of the last are not to be ignored as if without bearings of importance. Compared with a genus exclusively an inhabitant of the surface waters, another which dwells both near the surface and in the depths is likely to possess the wider distribution horizontally, as the surface genus may have its range limited by peculiarities of food and of temperature, agents which are less variable and less restrictive in the depths. From this it follows that a genus, or species, of great vertical range may possess a comparatively narrow horizontal range at the surface and a much broader one in the abysses; this is shown by fishes like Careproctus, Paraliparis, Lycodes, or Merluccius, known in the higher latitudes from both surface and bathybial waters, but found only at great depths in the torrid regions. In the case of a genus well established at considerable depths there is always a likelihood that its deep sea distribution is greater than its range near the surface. The existence of the wider abyssal ranges and the expectation of their probable determination by future research farther toward the poles, closer to the surface as well as in the depths, tend to deprive the deep sea genera of some of their importance in the solution of questions relating to origin and derivation, or to possible migrations through a channel once existing between the Caribbean Sea and the Pacific, or to others through a strait once dividing the Isthmus of Suez. In present knowledge, at the best, it may be said that definite conclusions regarding the sources of the Panamic deep sea fauna are not to be drawn from bathybial fishes alone with any great degree of assurance.

From a consideration of evidence on the question of a recent thoroughfare through the isthmus between the Caribbean and the Pacific there are among the hundred or more genera in the collection sixteen or seventeen new ones that may be passed with no comment here, as they have no ascertained distribution outside of the Panamic region of the Pacific, and besides these there are a dozen others that may also be put away because they have not yet been discovered on the Atlantic side of the isthmus. Of the remainder the following thirty-eight are known to occur in both the Panamic and the Caribbean sections, the latter including the Gulf of Mexico: Raia, Centroscyllium, Pontinus, Hoplostethus, Trichiurus, Chiasmodus, Lophius, Chaunax, Oncocephalus, Dibranchus, Prionotus, Peristedium, Callionymus, Lepophidium, Dicrolene, Monomitopus, Bassozetus, Læmonema, Phyciculus, Bregmaceros, Macrurus, Monolene, Symphurus, Sternoptyx, Argyropelecus, Cyclothone, Chlorophthalmus, Ipnops, Bathypterois, Myctophum, Stomias, Bathytroctes, Alepocephalus, Halosaurus, Uroconger, Congermuræna, Ophichthys, and Cryptopterus; and the list of those represented in the Panamic and in the Atlantic, but not yet found in the Caribbean and the Gulf is as follows: Isistius, Trachichthys, Caulolepis, Melamphaës, Careproctus, Paraliparis, Gymnelis, Lycodes, Mixonus, Porogadus, Diplacanthopoma, Bassogigas, Merluccius, Antimora, Trachyrhynchus, Maurolicus, Chauliodus, Idiacanthus, Notacanthus, Chlopsis, Venefica, Serrivomer, Labichthys, Nemichthys, and Myxine. Some of these have ranges so extensive as to indicate a ready passage from one ocean to the other by way of either the Arctic regions or the Antarctic; for instances Careproctus, Paraliparis, Gymnelis and Lycodes range so far to the north that they may pass through the Arctic, and others as Raia, Centroscyllium, Merluccius, Antimora, Macrurus, Cyclothone, Myctophum, Stomias, and Notacanthus have distributions indicative of possible migrations through a strait at some time crossing the Central American isthmus, and which also show freedom of way through both of the polar oceans. The genera taken by this expedition in the Panamic region, known also to occur in the Atlantic, and possessed of recorded distributions that would somewhat exclusively favor a passage through a Panamic strait comprise more than forty per cent of the whole number captured, as shown in the following list: Pontinus, Hoplostethus, Caulolepis, Trachichthys, Trichiurus, Chiasmodus, Lophius, Chaunax, Oncocephalus, Dibranchus, Peristedium, Callionymus, Lepophidium, Mixonus, Dicrolene, Porogadus, Monomitopus, Bassozetus, Diplacanthopoma, Bassogigas, Læmonema, Phyciculus, Bregmaceros, Trachyrhynchus, Monolene, Symphurus, Argyropelecus, Bathypteroïs, Maurolicus, Chauliodus, Idiacanthus, Alepocephalus, Halosaurus, Uroconger, Congermuræna, Ophichthys, Cryptopterus, Venefica, Serrivomer, Labichthys, Nemichthys. This large proportion of all the genera secured might be regarded as much more conclusively proving the existence of a Central American connection between the Atlantic and the Pacific if it were not that the determined ranges are only partial and that, presumptively, by future collecting they will in many cases if not in all be extended into the polar waters.

In regard to a former strait through the isthmus of Suez the testimony of these genera is even more unsatisfactory than that concerning one through the isthmus of Panama, as Africa does not extend so far south as South America does by more than eighteen degrees and consequently is much less of a barrier to migration. The known ranges of the following may be cited as less or more remotely favoring the theory of a recent connection between the Mediterranean Sea and the Indian Ocean: Raia, Hoplostethus, Trachichthys, Melamphaës, Trichiurus, Chiasmodus, Lophius, Chaunax, Dibranchus, Peristedium, Callionymus, Dicrolene, Monomitopus, Diplacanthopoma, Macrurus, Symphurus, Sternoptyx, Argyropelecus, Chlorophthalmus, Bathypteroïs, Chauliodus, Bathytroctes, Alepocephalus, and Uroconger.

Lamprogrammus, Scopelengys, Narcetes, and Xenomystax have been discovered in the Panamic area and in the northern portions of the Indian Ocean only, and Acanthonus has been secured north of New Guinea, in the Philippines, and in the Panamic section of the Pacific. The immense gaps apparently existing in these distributions are more likely to be due to lack of search than to actual absence from the immense spaces intervening between the points at which species of these genera have already been obtained.

A better idea of the general distribution, and of the weight and present condition of the evidence relating to former straits near Panama and in the neighborhood of Suez will perhaps be obtained from the following summaries relating to such genera in the collection as have also been obtained in other localities.

Raja:—Occurring in the Panamic region of the Pacific, in the Caribbean, the Mediterranean, the Arabian Gulf, the Bay of Bengal, the Indian Ocean, on both sides of the Atlantic and of the Pacific, from north latitude of 80° to south latitude of 55° or more, in all oceans, in fact, this genus can be relied on to establish very little concerning an eastward strait from the Panamic or another from the Mediterranean. The species now known from the Caribbean and those from the Panamic region are not very closely allied.

Centroscyllium: — Is taken in the Panamic region, in the north Atlantic to Greenland, near the Falkland Islands, in the Mediterranean Sea, the Arabian Gulf, and the Bay of Bengal, but has little bearing on early connections across Panama and Suez because of the close agreement of the species throughout the entire range.

Isistius: — Ranging from the Panamic to Alaska, in 55° north, and to the middle Pacific, found in the Atlantic at Rio de Janeiro, in the Gulf of Guinea, and in the Indian Ocean from Madagascar to Australia, this shark is one of the most likely to pass from ocean to ocean at the southward of either America or Africa.

Pontinus: — The present record from the Panamic, from the Gulf of Mexico to Cape Hatteras, from the Mediterranean and from off the northwest coasts of Africa, places this genus strongly in favor of recent migrations through a Panamic strait.

Hoplostethus: — A distribution in the Panamic region, through the Caribbean and the Gulf of Mexico to New York, from Madeira and the northwestern coasts of Africa to the Mediterranean, in the Bay of Bengal, and in the Sea of Japan, makes Hoplostethus at once favorable to a migration westward from the Caribbean and to that advocated by Alcock between the Mediterranean and the Indian Ocean.

Trachichthys: — Known from the Panamic region, from Chili, from northwest Africa to the Mediterranean, from the Bay of Bengal to Japan, Australia and New Zealand, this genus must be regarded as a likely one to range southward of the great continents.

Caulolepis: — The position of the three localities from which this genus has been recorded, off New York, off Lower California, and off Panama, together with the very close relationship existing between the species of the Atlantic and that of the Pacific, renders Caulolepis one of the best for the present to cite in support of a recent thoroughfare across the isthmus of Panama.

Melamphaës: — From the Panamic to Puget Sound, the western Central Pacific, off the eastern coasts of the United States and of South America, off the northwestern coasts of Africa, from the Bay of Bengal and from the

Antarctic, Melamphaës gives little light on the special points under consideration; it apparently has closer affinities between its species across the Pacific than across Central America.

Trichiurus: — Panamic to Lower California, the Caribbean and Gulf to New York and to Montevideo, off Portugal, the Arabian Sea, Bay of Bengal, Japan, New Zealand, and Madagascar outline a distribution that may be used in support of both a Panamic and an east Mediterranean strait. The species on the two sides of Central America have very close affinities.

Chiasmodus: — The known range of this genus includes the following: south of the Gulf of California, off Pernambuco in the mid-Atlantic, off northwestern Africa, and in the Bay of Bengal. These are points somewhat favorable to the theory of a Central American water way between the two oceans.

Lophius: — Retaining Lophiomus in this genus the distribution includes the Panamic and the Caribbean, Cape Hatteras to Newfoundland, Cape Verdes to Norway, the Mediterranean, Arabian Gulf, Bay of Bengal, Japan and the Philippines, and off New Guinea and South Africa. The genus does not readily support the idea of a Panamic strait because of the wide differences in the species at opposite sides of the isthmus.

Chaunax: — Recorded from the Panamic, the Caribbean and the Gulf to off New York, off northwestern Africa, in the Arabian Gulf, the Bay of Bengal, and off the Fiji Islands. The species on opposite sides of Central America differ radically. Some authors find the same species in both the Atlantic and the western Pacific, an identification that is somewhat questionable.

Oncocephalus: — Obtained from the Panamic and from the Caribbean and the Gulf of Mexico to Labrador and to Rio de Janeiro. Advocates of the theory of a recent upheaval of the Central American isthmus will hardly find a better instance in their favor, on account of the distribution and the very close relationship of the Panamic to the Caribbean species.

Dibranchus: — Inhabits the Panamic region to the Gulf of California, the Caribbean and the Gulf of Mexico to New York, the region off Soudan and the Cape Verdes, and the Arabian Sea and the Bay of Bengal. As a genus Dibranchus supports the idea of a more or less recent Caribbean strait; the affinities of the species, however, are but moderately close.

Malthopsis: — Species occur in the Panamic section to the Gulf of California, off the Hawaiian Islands, and in the Bay of Bengal. Not yet known in the Atlantic. In this case it would appear as if the distribution had extended across the entire Pacific into the Indian Ocean.

Prionotus: — Distributed through the Panamic area to the Gulf of California, through the Caribbean and the Gulf of Mexico to Nova Scotia and to Patagonia, and in the Bay of Bengal and the Sea of Japan. The occurrence of species of Prionotus at the southern extremity of South America reduces the value of its evidence concerning a Panamic strait.

Peristedium: — Established in the Panamic waters, about the Hawaiian Islands, in the Caribbean and the Gulf of Mexico to New York, at Bahia, around Great Britain, off Portugal, in the Mediterranean, the Arabian Gulf, the Bay of Bengal, the Sea of Japan, and off New Guinea. The range of this genus gives it considerable weight as evidence in favor of either the Caribbean or the Mediterranean thoroughfares.

Careproctus: — The localities include the Gulf of Panama, California to Oregon, Bering Sea, off Kamtchatka, Greenland to the Faröes to Spitzbergen and to the Kara Sea, and off the Azores. The distribution will probably be found to extend through the Arctic Ocean. The habits of the species are such as, with the fact of having been already discovered near the equator, to induce expectation of a general extension of the range of the genus through all the oceans at great depths.

Paraliparis: — Secured off Panama, in the Gulf of California to Oregon, Bering Sea, off New York to Iceland, the Faröes and Jan Mayen. Excepting the occurrence of a species off Patagonia, the range closely corresponds with that of Careproctus, and similar extensions may be expected.

Callionymus: — Abundant off Panama, in the Caribbean and Gulf of Mexico, in the Gulf Stream to South Carolina, off the British Isles, the Azores, and the Canaries, in the Mediterranean and the Bay of Bengal, and off Japan, Tasmania, and Madagascar. From the range so far as determined it appears that Callionymus is of the better genera to bring forward in favor of either the Panamic or the Red Sea connections of the Atlantic.

Maynea: — Between the Galapagos and Panama, and the Straits of Magellan are localities that indicate a probable range for this genus along the entire west coast of South America. The species from off Mexico, from Puget Sound and from Bering Sea heretofore placed in Maynea have been removed into closely allied genera, Bothrocaropsis and Bothrocara.

Gymnelis: — Apparently ranging from the Panamic northward in the

Pacific to Bering Sea, and from Nova Scotia to Davis Straits, to north of Iceland to Norway and to Finmark.

Lycodopsis:—Has a range, in present determination, from the Panamic area northward to California, Puget Sound, the Aleutian Islands and to Japan.

Lycodes:—Inhabits the Pacific from the Panamic to California and Bering Straits, and the Atlantic from off Cape Cod, Newfoundland, and Greenland to north of Iceland, Norway, Finmark, and to the Kara Sea; also found off the Azores, and the Cape Verdes, and in the Straits of Magellan. On the charts the distribution of this genus in a measure suggests extension of range from the Atlantic through the Arctic and Bering Straits into the Pacific and down the western coasts of North America.

Phucocœtes:—Thus far identified only from two localities, off the Bay of Panama and in Magellan's Straits.

Lycodapus:—Now known from the Panamic, Bering Sea, and off California and Lower California.

Lepophidium:—With a range including the Panamic to California, and the Caribbean and Gulf of Mexico to South Carolina and to Bahia, Lepophidium is one of the best supports of the theory of a transisthmian water-way.

Mixonus:—The small number of the localities, Panamic, off the mouth of the Amazon, and off the Canaries, in connection with the great depths at which the species are found, raises doubt whether the genus if better known would support the idea of a Panamic connection with the Atlantic as well as the positions of the ascertained localities would indicate.

Dicrolene:—In evidence from the Panamic to Mexico, from the Caribbean and the Gulf of Mexico to off New York, off the Canaries, in the Arabian Sea and the Bay of Bengal. In its known distribution this is one of the best of the genera to be used in confirmation of the theory of a passage westward from the Caribbean, as also of one eastward from the Mediterranean.

Porogadus:—This genus occurs in the Panamic, in the Gulf of California, off New York, off North Australia and off Borneo. It has not yet been identified from the Caribbean.

Monomitopus:—Another of the genera most available in discussions of probable mid-Atlantic connections with the Pacific and the Indian Ocean. Reported from the Panamic, the Caribbean and the Gulf of Mexico, the Canaries, the Azores, the Arabian Sea, and the Bay of Bengal.

Bassozetus: — Off Panama to Mexico, the Caribbean and the Gulf to off New York, the middle of the equatorial Atlantic, off North Australia, and off the Philippines, form a series of localities of use in favor of an American strait, but of little avail in relation to that east of the Mediterranean Sea.

Diplacanthopoma: — Dredged in the Panamic, off Pernambuco, off the Cape Verdes, in the Arabian Sea, and in the Bay of Bengal. But remotely favoring either of the straits under consideration.

Bassogigas: — Heretofore taken only in the Panamic, the Gulf of California, and off New York.

Neobythites: — Restricting the genus somewhat narrowly it retains the following localities: Caribbean and Gulf of Mexico, off Pernambuco, Arabian Sea, Bay of Bengal to the Philippines and Japan, and Fiji Islands. If, however, its closest allies are united with it as subgenera it ranges into the Panamic.

Catætyx: — The three localities from which Catætyx has been secured, Messier's Straits, the Panamic region, and off California, are all in the eastern Pacific.

Acanthonus: — Only known from the localities Panamic, north of New Guinea, and off the Philippines.

Lamprogrammus: — Previous to its discovery in the Panamic this genus was known only from the Arabian Sea and the Bay of Bengal; as now determined it is found in two regions near the equator and about 160° apart.

Merluccius: — Discovery of this genus in the Panamic region deprives it of a supposititious bipolar distribution; it had been taken off California to Puget Sound, off Chili to Patagonia and to Montevideo, off Florida to Labrador, Greenland, Iceland and the British Isles, off the Cape Verde Isles to the Mediterranean Sea, and off New Zealand.

Antimora: — Though not yet identified from the Straits of Magellan this genus has been taken in the Antarctic. Its distribution bears some resemblance to that of Merluccius, in that it has been reported from the Panamic, from California, Puget Sound, off South Carolina to the Banks of Newfoundland, and off Montevideo.

Læmonema: — A theory of a Caribbean strait is well supported by the distribution of this genus as now determined. Species have been taken in the Panamic, in the Caribbean and the Gulf of Mexico to off Delaware, off the Canaries and the Straits of Gibraltar and off Montevideo.

Phycictulus: — The points at which species of this genus have been captured support the idea of a strait from the Caribbean fairly well, and they favor that of one from the Mediterranean but little less. Panamic, off Lower California, in the Caribbean and Gulf to off New York, off the Cape Verdes and the Canaries, in the Bay of Bengal and off Japan, Australia, and New Zealand.

Bregmaceros: — Such a range as that indicated by the localities Panamic, off Acapulco, Caribbean and Gulf, Arabian Sea, Bay of Bengal, China Sea, Philippines, and Amboyna, and middle of the Indian Ocean is entirely tropical and is favorable to an outlet westward from the Caribbean, but somewhat less so to one in the same direction from the Red Sea.

Macrurus: — There are few genera with broader ranges than appears in the following localities for Macrurus: Panamic to Bering Sea, Chili, Straits of Magellan, Hawaiian Islands and southward to New Zealand and Australia, Caribbean and Gulf of Mexico to Nova Scotia, Davis Straits, Iceland, Faröes, Finmark, Norway, British Isles to the Mediterranean, Azores and Cape Verdes, Pernambuco to Patagonia, Arabian Sea, Bay of Bengal to Celebes, Japan and eastward to the mid-Pacific, Madagascar, and the Antarctic. Favors Arctic, Antarctic, or torrid routes from ocean to ocean about equally.

Trachyrhynchus: — In its distribution there are as yet no locations near the Caribbean; the genus has been secured from the Panamic, south of Iceland, off the Faröes, off Portugal, in the Mediterranean, and off New Zealand.

Monolene: — Hardly any of the genera favor a Panamic strait, either by relationship of species or by localities, more than this one. The known range is from the Panamic to Mexico and from the Caribbean and the Gulf of Mexico to New York.

Symphurus: — Both the list of localities given for this genus and the close affinities of the species favor either of the two straits under consideration. Species have been obtained in the Panamic to California, in the Caribbean to off New England and to Montevideo, in the Mediterranean to off the Soudan, and in the Bay of Bengal to the Arabian Sea.

Sternoptyx: — Antarctic localities render the distribution of Sternoptyx less important in a discussion of outlets from the Caribbean and the Mediterranean than that of many of the other genera. The list includes the Panamic, off California, the Hawaiian Islands, the Caribbean and Gulf of Mexico to the Newfoundland Banks, the mid-Atlantic to off Morocco and Sierra Leone, the Arabian Gulf, Kermadec Islands, East Indies, and Japan.

Argyropelecus: — Stands fairly well toward a Caribbean strait and but tolerably fair in respect to one from the east end of the Mediterranean. It is known from the Panamic, the Caribbean, from the Banks of Newfoundland to South Carolina, from off Norway to France, from Portugal, the Cape Verdes, the Canaries, and South Africa, and from the Mediterranean and the Bay of Bengal.

Valenciennellus: — Not yet known from the Panamic, having been collected west of San Diego, California. Other localities are Denmark Straits and Madagascar.

Maurolicus: — Various species have been secured in the Panamic to the Gulf of California and to California, off New York, off Norway, and in the Mediterranean Sea.

Cyclothone: — Evidently an inhabitant of all the deeper marine waters; found in the Panamic to Puget Sound and the mid Pacific, in the Caribbean and the Gulf to Newfoundland Banks, in Davis and Denmark Straits and off Iceland, in the Bay of Biscay to Madeira, in the mid Atlantic and off Sierra Leone, in the Arabian Gulf and the Bay of Bengal to the East Indies, Japan, Australia and New Zealand, and in the Antarctic. To be cited in favor of Arctic, Antarctic, or Caribbean Strait migrations with about the same assurance.

Chlorophthalmus: — Present in the Panamic, the Hawaiian Islands, Chili, the Caribbean and the Gulf of Mexico to off New York in the Gulf Stream, in the mid Atlantic off Madeira, the Cape Verdes, Bahia, and Montevideo, in the Mediterranean and the Bay of Bengal, east and south of Australia and in the Antarctic. If the species on the two sides of Central America were more closely allied this genus might be considered fair evidence in favor of a Panamic strait.

Scopelengys: — Two localities only are to be given for this genus, the Panamic and the Laccadive Sea.

Bathypteroïs: — One of the genera which by known range and specific affinities most favors the Central American strait. Species have been taken in the Panamic to the Gulf of California, mid south Pacific, Fijis, in the Caribbean and the Gulf Stream to off New York, off Pernambuco and Montevideo, off Madeira and the northwest coast of Africa, and in the Arabian Gulf and Bay of Bengal.

Ipnops: — If it were not for the great extent to the southward of its distribution Ipnops would be much better evidence for Caribbean westward migrations; it has been taken in the Panamic, the Caribbean and the Gulf of Mexico, off Pernambuco, midway from Tierra del Fuego to Cape Good Hope, and north of New Guinea.

Myctophum: — General in distribution. Panamic to Alaska and the Hawaiian Islands, Chili, Caribbean and Gulf of Mexico to Davis and Denmark Straits the Faröes and Spitzbergen, Montevideo, off northwest Africa, Mediterranean, off Madagascar and South Africa, Bay of Bengal, Philippines to Fijis, southeast of Australia, east of New Zealand, and in the Antarctic to 62° south.

Chauliodus: — Too broadly distributed to have very much weight in the present discussion. Secured in the Panamic and along the Californian coast to the Aleutian Islands, off the Society Islands, off the Bermudas and Morocco, in the mid equatorial Atlantic, in the Mediterranean, the Arabian Gulf and the Bay of Bengal, off Japan and New Guinea. The Panamic species is very distinct.

Stomias: — The great range southward detracts from what otherwise would be of the best evidence in support of the tropical Atlantic outlets. The known localities are the Panamic to the Gulf of California, the Caribbean, the Gulf Stream off New York, south of Greenland, off the Cape Verdes to the Bay of Biscay and the Mediterranean, the Arabian Gulf, east of Tasmania, and south of Australia in the Antarctic.

Idiacanthus: — Remotely bears in favor of the Central American strait. Found in the Panamic, off southern California, in the mid north Atlantic, northwest of Australia, and north of New Guinea.

Bathytroctes: — It may be said of the range of Bathytroctes that it points with tolerable directness toward the existence at some time of a strait west of the Caribbean, less directly toward a possible migration of species through the Arctic, and similarly toward a strait at Suez. The localities are Panamic, off Vancouver's Island, the Gulf of Mexico, Denmark Straits, off the northwest coast of Africa to the Azores, off Pernambuco, Arabian Sea, Bay of Bengal, and north of Celebes.

Narcetes: — Better perhaps placed with Bathytroctes, but adding nothing to its range. Discovered only in the Panamic and in the Arabian Gulf.

Alepocephalus: — The Caribbean and the Mediterranean thoroughfares both find support in the distribution of Alepocephalus in its present limits.

The genus has been located in the Panamic, off Mexico, off California, in the Caribbean, in the Gulf Stream off the eastern United States and the Grand Banks, southeast of Greenland, European coasts to the Mediterranean and the northwestern coasts of Africa, off the Azores, in the Bay of Bengal, and north of Australia.

Halosaurus: — Important in its bearing on the Central American connection, remote as concerns that of the Mediterranean, and fair in relation to migrations from ocean to ocean by way of the Antarctic. The locations are the Panamic, the Caribbean and the Gulf of Mexico to off New England, the mid Atlantic, the Azores and Cape Verdes to Gibraltar, the Arabian Gulf, the Bay of Bengal, off the Philippines and Japan, and in the Antarctic.

Notacanthus: — About equally remote in its bearings toward migrations from or to the Atlantic or the Pacific by way of either the Arctic Ocean, the Antarctic, or a Central American strait. The localities include the Panamic, off South Carolina to the Grand Banks, south of Greenland and Iceland, off the Canaries, west of Magellan's Straits, off New Zealand, and off southwestern Australia.

Uroconger: — Good evidence concerning a Central American strait, and fair in relation to that from the Mediterranean eastward, credited to the Panamic, the Caribbean and the Gulf of Mexico, the Canaries, Arabian Gulf and Bay of Bengal to the China Sea, Borneo and New Guinea.

Congermuræna: — Though it extends far toward the south the distribution of this genus in the main favors both of the straits with which we are here concerned; the following localities are on record: Panamic, Gulf of California, Hawaiian Islands, Caribbean and Gulf of Mexico, mid south Atlantic, Mediterranean Sea, Bay of Bengal, Japan, East Indies, Australia, the Fijis; New Guinea, New Zealand, and the Antarctic.

Ophichthys: — Accepting the genus in its more inclusive sense it may be placed with those which are used to establish the former recent existence of straits eastward from the Panamic and from the Mediterranean. The localities are numerous; the range includes the Panamic to southern California and to southern Chili, the Caribbean and the Gulf of Mexico to Cape Hatteras and to Montevideo, off the entire coast of Africa, the Mediterranean, the Arabian Gulf, the Bay of Bengal, Japan, East Indies, Australia, the Fijis, and other localities of the Indian and western Pacific Oceans.

Cryptopterus: — Being shoal water species and very closely allied on the opposite sides of the isthmus, there are none more pertinent in the present inquiry than those of this genus. The two localities are the Panamic region and the Caribbean Sea.

Xenomystax: — As was the case with a number of the other genera the species of this genus are reported only from widely separated localities. From the Panamic, and in the Arabian Gulf, off the Maldives and off Travancore.

Chlopsis: — The known locations are the Panamic region and the Mediterranean Sea.

Venefica: — A westward Caribbean outlet would accord well with a range which comprises the Panamic to off southern California, off South Carolina, and off the Canaries.

Serrivomer: — Similar to Venefica in its bearings on the questions before us; found in the Panamic, Gulf of California, east of Delaware, and off the Azores.

Labichthys: — Like Serrivomer in connection with the theory of a Panamic strait, but of wider range. Has been taken in the Panamic, off Alaska, east of New York, off Pernambuco, off the Azores, and off Sierra Leone.

Nemichthys: — The comparatively few localities from which species of Nemichthys have been taken are so distributed as to accord well with the theory of a strait at the west end of the Caribbean and also with that of one at the east end of the Mediterranean; the localities are the Panamic area, Gulf of California, Puget Sound, Alaska, off South Carolina to New England, off the Canaries and Madeira, and in the Bay of Bengal.

Myxine: — While the genus as a whole appears to agree in the main with the idea of an eastern connection of the Panamic with the Caribbean the great difference in the species on the opposite sides of the isthmus in great measure does away with the value of the testimony; the evidence is also rendered less important by the presence of Atlantic species in the Straits of Magellan. The list of localities at present includes the Panamic region, Straits of Magellan and vicinage, off North Carolina, off New England, off Nova Scotia, off the British Isles and northern Europe to Portugal and the Mediterranean, and off Japan.

LIST OF THE KNOWN SPECIES OF DEEP SEA FISHES,

SHOWING THEIR RANGE IN DEPTH AND THEIR PRINCIPAL LOCALITIES.

Explanation of Letters, etc.

A.	"Albatross"	Expeditions of U. S. Fish Commission.	K.	"Knight Errant"	Expedition	(English).
B.	"Blake"	" of U. S. Coast Survey.	N.	"Norwegian"	North Sea Expeditions.	
C.	"Challenger"	" (English).	T.	"Talisman"	Expeditions	(French).
F.	"Fish Hawk"	" of U. S. Fish Commission.	Tr.	"Travailleur"	"	(French).
H.	"l'Hirondelle"	" of Monaco.	Tt.	"Triton"	"	(English).
I.	"Investigator"	" of India Marine Survey.	W.	"Washington"	"	(Italian).
Ing.	"Ingolf"	" (Danish)	*	Indicates species of the present collection.		

In the Bathymetrical Range.

–250 A. means that the species ranges from the surface to 250 fathoms, and that the greatest depths were determined by the "Albatross" Expeditions.

400–500 C. gives the upper and lower limits, both as determined by the "Challenger," or

400–500 C. I. gives the upper limit as taken by the "Challenger" and the lower as by the "Investigator."

200 T. shows that the species has been taken at that depth by the "Talisman," further bathymetrical range being unknown.

300 without authority means approximately of that depth.

	Range in Depth. Fathoms.	Principal Localities.
HOLOCEPHALA Müll.		
Chimæroidei.		
CHIMÆRA Linn.		
C. monstrosa Linn., 1758.	–687 T.	Faröes and northern Europe to Med. Sea, Azores, and Soudan; Cape Good Hope.
"*C. monstrosa* Linn. ?" Alc., 1892.	410 I.	Off the Coromandel coast.
C. affinis Cap., 1868.	200–1285	Both sides of the north Atlantic.
C. Colliei L. B., 1839.	–150	Off California to Alaska.
CALLORHYNCHUS Gron.		
C. callorhynchus Linn., 1758.	–150	Southern Pacific ; off west coast Chili.
C. indicus (=Callorhynchus Sp. Alc., 1891).	561 I.	West coast of the Andamans.
HARRIOTTA G. B.		
H. Raleighana G. B., 1894.	707–1081 A.	Off east coast United States.
PLAGIOSTOMIA Dum.		
PLATOSOMIA Raf.		
Raioidei.		
UROLOPHUS M. H.		
U. kaianus Günt., 1880.	129 C.	Off the Ki Islands.
BENTHOBATIS Alc.		
B. Moresbyi Alc., 1898.	430 I.	Off the Travancore coast.

	Range in Depth. Fathoms.	Principal Localities.
Raia Linn.		
R. mammilidens Alc., 1889.	597 I.	Gulf of Manaar.
R. isotrachys Günt., 1887.	365 C.	South of Japan.
R. nidrosiensis Coll., 1881.	100–300	Coasts of northern Europe.
R. batis Linn., 1758.	200	Coasts of Europe.
R. vomer Fries, 1838.	100–150	Coasts of northern Europe.
R. fullonica Linn. 1758.	335 T.	Off European coasts.
R. circularis Couch, 1838.	516 Tt.	Coasts of northern Europe.
R. hyperborea Coll., 1878.	459 N.	Off Spitzbergen, in Lat. 80° N.
R. ingolfiana Lütk., 1898.	389 Ing.	Lat. 66° 35′ N., Lon. 56° 38′ W.
R. borea (=*R. hyperborea* Günt., 1887).	400–1309 K., Ing.	Off coasts of northern Europe; north of the Faröes and Iceland.
R. radiata Don., 1820.	–459	Both sides of the north Atlantic; off Spitzbergen, Lat. 79° 59′ N.
R. Fyllæ Lütk., 1887.	426–582 Ing.	Off S. Greenland; Denmark Straits.
R. senta Garm., 1885.	150	Off the Grand Banks S. of Newfoundland.
R. lævis Mitch., 1817.	–150	Off New England coasts.
R. plutonia Garm., 1881.	229–333 B.	Gulf Stream off S. Carolina.
R. ornata Garm., 1881.	138 B.	Off Alligator Key, Fla.
R. alia (=*R. Ackleyi* G. B., 1896).	210 A.	Near mouth of Miss. River in Gulf of Mexico.
* *R. badia* Garm.	1270 A.	Off Cape Mala, Gulf of Panama.
R. abyssicola Gilb., 1896.	1588 A.	Off Q. Charlotte's Island.
R. trachura Gilb., 1891.	625–822 A.	Southern California to Alaska.
ANTACEA Raf.		
Squaloidei.		
Scyliorhinus Blainv.		
S. caniculus Linn., 1758.	–100	Off coasts of Europe.
S. canescens Günt., 1878.	400 C.	Off southwestern coasts of South America.
S. ventriosus Garm., 1880.	–150	Acapulco and northward.
S. retifer Garm., 1881.	89–200 B.	Off E. coast U. S. to Barbados.
S. spinacipellitus Vaill., 1888.	533 T.	Off the Canary Islands.
S. acutidens Vaill., 1888.	517 T.	" " "
S. xaniurus Gilb., 1891.	184–684 A.	Off coasts of California.
S. brunneus Gilb., 1891.	100 A.	Gulf of California.
S. cephalus Gilb., 1891.	362–460 A.	" "
S. hispidus Alc., 1891.	188–220 I.	Andaman Sea.
S. profundorum G. B., 1896.	816 A.	Off New Jersey in Gulf Stream.
"*S.? canescens*" Alc., 1896.	620–690 I.	Arabian Sea.
Pristiurus Bon.		
P. melastomus Raf., 1810.	400–500	Mediterranean and neighboring Atlantic.
Centroscyllium M. H.		
C. Fabricii Rein., 1829.	–817 T.	Both sides of N. Atlantic; off Bank of Arguin.
C. granulatum Günt., 1887.	245 C.	Falkland Islands.
C. ornatum Alc., 1889.	285–690 I.	Bay of Bengal; Arabian Sea.
* *C. nigrum* Garm.	546–555 A.	Off the Galapagos Islands.
Etmopterus Raf.		
E. spinax Linn., 1758.	–328	Northern Europe to the Mediterranean.
E. granulosus Günt., 1880.	125 C.	Off southwestern coasts of South America.
E. pusillus Lowe, 1839.	317 T.	Off Madeira.
Centrophorus M. H.		
C. granulosus M. H., 1841.	300	Mediterranean and neighboring Atlantic.

	Range in Depth. Fathoms.	Principal Localities.
C. squamulosus Günt., 1877.	345 C.	Off Inosima, Japan.
C. lusitanicus B. C., 1864.	300	Off Portugal.
C. crepidater B. C., 1864.	300	Off Portugal and Madeira.
C. squamosus Gmel., 1788.	672–1013 T.	Off coasts of Portugal.
C. Dumérilii Johns., 1867.	300	Off Madeira.
C. foliaceus Günt., 1877.	232 C.	Off Inosima, Japan.
C. calceus Lowe, 1839.	672–1013 T.	Off the bank of Arguin.
C. Rossi Alc., 1898.	430 I.	Off the Travancore coast.
Centroscymnus Boc.		
C. cœlolepis B. C., 1864.	400	Portugal to Madeira.
C. obscurus Vaill., 1888.	784 T.	Off Soudan.
Scymnodon Boc.		
S. ringens B. C., 1864.	400	Off Portugal.
Oxynotus Raf.		
O. centrina Linn., 1758.	300	Mediterranean and neighboring Atlantic.
Squalus Linn.		
S. uyatus Raf., 1810.	328 W.	Mediterranean.
Scymnorhinus Bon.		
S. licha Bonn., 1788.	328 W.	Gulf of Genoa.
Isistius Gill.		
* *I. brasiliensis* Q. G., 1824.	1360 A.	Off Culpepper Island.
Somniosus Les.		
S. carcharias Müll., 1776.	–300	Off Norway; Northern Atlantic, both sides.
Chlamydoselachus Garm.		
C. anguineus Garm., 1884.	150	Sea of Sagami, Japan; Yeddo Bay; off Funchal; off Norway.
TELEOSTEA.		
ACANTHOPTERYGII.		
Percoidei.		
Polyprion Cuv.		
P. americanus B. S., 1801.	400	Off Madeira.
Liopropoma Gill.		
* *L. longilepis* Garm.	85–100 A.	Off coast of Colombia.
Serranus Cuv.		
S. æquidens Gilb., 1890.	112 A.	Off coasts of Lower California.
* *S. Bulleri* Boul., 1895.	100 A.	Off the Cocos Islands.
Centropristis Cuv.		
C. pleurospilus Günt., 1880.	140 C.	Ki Islands.
C. annularis Günt., 1880.	"30 or 350" C.	Off Pernambuco.
Chelidoperca Boul.		
C. investigatoris Alc., 1890.	102 I.	Off Madras coasts.
Anthias Bl. S.		
A. megalepis Günt., 1888.	140 C.	Ki Islands.
* *A. cos* Gilb., 1890.	112 A.	Coasts of California.
* *A. multifasciatus* Gill, 1883.	66–112 A.	
A. aquilonaris G. B., 1896.	524 B.	Off Dominica, W. I.
Centristhmus Garm.		
* *C. signifer* Garm.	127 A.	Off Panama.
Bathyanthias Günt.		
B. roseus Günt., 1880.	"30 or 350" C.	Off Pernambuco.
Synagrops Günt.		
S. philippinense Günt., 1880.	102 C.	Philippines.
S. japonicus Död., 1883.	300	Off Tokyo, Japan.

	Range in Depth. Fathoms.	Principal Location.
PRIACANTHUS C. V.		
P. catalufa Poey, 1863.	243 B.	Off Havana.
PROPOMA Günt.		
P. roseum Günt., 1880.	140 C.	Ki Islands.
BREPHOSTOMA Alc.		
B. Carpenteri Alc., 1890.	1520 I.	Bay of Bengal.
DENTEX Cuv.		
D. macrophthalmus Bl., 1791.	224 T.	Off Soudan and Morocco.
VERILUS Poey.		
V. sordidus Poey, 1860.	200	Off Havana.
SCOMBROPS T. S.		
S. chilodipteroides Schl., 1850.	345 C.	Off Inosima, Japan.
HYPOCLIDONIA G. B.		
H. bella G. B., 1896.	90–280 A.	Gulf of Mexico ; off east coast United States.
APOGON LaC.		
A. pandionis G. B., 1881.	157–324 B.	Off east coast of the United States.
EPIGONUS Raf.		
E. telescopus Risso, 1810.	340–532 T.	Off Canaries and Madeira.
E. occidentalis G. B., 1896.	237 B.	Off Barbados.
MALAKICHTHYS Död.		
M. griseus Död., 1883.	300	Japan Sea.
Scorpænoidei.		
SCORPÆNA Linn.		
S. dactyloptera De la R., 1809.	–532 T.	Mediterranean to the Canaries.
S. madurensis C. V., 1833.	–312 F.	Off east coasts United States ; Madeira.
S. cruenta Rich., 1842.	? 120 C.	Twofold Bay, South Australia.
S. percoides Rich., 1842.	400 C.	Twofold Bay ; off Cape Farewell.
S. cristulata G. B., 1896.	440 B.	Off Georgia coasts.
S. ustulata Lowe, 1840.	200	Madeira.
S. remiger G. C., 1896.	298 A.	Hawaiian Islands.
PONTINUS Poey.		
P. filifer Val., 1842.	250 T.	Canaries.
P. longispinis G. B., 1896.	111-142 A.	Gulf of Mexico.
P. macrolepis G. B., 1896.	130 A.	Off Yucatan.
P. sierra Gilb., 1890.	112 A.	Off Californian coasts.
* *P. furcirhinus* Garm.	210 A.	East of the Galapagos.
SEBASTES Cuv.		
S. marinus Linn., 1758.	–917 A.	Both sides of the North Atlantic ; Davis Straits.
S. viviparus Kröy., 1845.	–300	North Atlantic, both sides.
S. hexanema Günt., 1880.	140–220 C., I.	Ki Islands ; Andaman Sea.
S. macrochir Günt., 1880.	365 C.	Off Inosima, Japan.
S. oculatus C. V., 1833.	345 C.	Near Straits of Magellan.
S. Kuhlii, Bowd., 1825.	1274 T.	Off Soudan and Bank of Arguin.
S. alascanus Bean, 1890.	159 A.	Coasts of Alaska.
S. altivelis Gilb., 1896.	625 A.	South of Alaska.
S. Jordani Gilb., 1896.	64–124 A.	Coasts of California.
S. Goodei Eig., 1890.	155	" "
S. alutus Gilb., 1890.	150 A.	" "
S. rupestris Gilb., 1890.	150 A.	" "
S. zacentrus Gilb., 1890.	150 A.	Coast of Mexico.
S. saxicola Gilb., 1890.	155 A.	Coast of S. California.
S. introniger Gilb., 1890.	266 A.	Coast of California.
S. sinensis Gilb., 1890.	145 A.	" "

	Range in Depth. Fathoms.	Principal Localities.
S. semicinctus Gilb., 1896.	155 A.	Coast of California.
S. diploproa Gilb., 1890.	124 A.	" "
S. aurora Gilb., 1890.	267 A.	" "
Ectreposebastes Garm.		
* *E. imus* Garm.	384 A.	Off Bindloe Island.
Bathysebastes S. D.		
B. albescens S. D., 1884.	200	Japan Sea.
Lioscorpius Günt.		
L. longiceps Günt., 1880.	140–220 C., I.	Ki Islands; Andaman Sea.
Setarches Johns.		
S. Güntheri Johns., 1862.	287 T.	Off the Cape Verde Islands.
S. fidjiensis Günt., 1887.	315 C.	Fiji Islands.
S. parmatus Goode, 1880.	93–280 B., A.	Off Barbados; Gulf Stream off Cape Hatteras.
Berycoidei.		
Hoplostethus C. V.		
H. mediterraneus C. V., 1829.	784 T.	Mediterranean Sea; off Soudan and Morocco.
H. japonicus Hilg., 1879.	320 I.	Japan; off Ceylon.
H. atlanticus Coll., 1889.	851 H.	Azores.
* *H. pacificus* Garm.	384 A.	Galapagos Archipelago.
Trachichthys Shaw.		
T. intermedius Hect.	272–400	Off Cape Farewell; E. of New Zealand; Ceylon.
T. Darwinii Johns., 1856.	320 I.	Madeira; off Ceylon.
* *T. mento* Garm.	458–511 A.	Off the coast of Colombia.
Anoplogaster Günt.		
A. cornutus C. V., 1833.	150–1686 A.	European coasts; Gulf Stream in Lat. 39° 18′ 30″ N.; Lon. 68° 24′ W.
Caulolepis Gill.		
C. longidens Gill, 1883.	1641 A.	Eastward of the Chesapeake Bay in Gulf Stream.
* *C. subulidens* Garm.	776–1832 A.	Gulf of Panama; off Southern California.
Melamphaës Günt.		
M. microps Günt., 1878.	1375 C.	Cape Good Hope to Kerguelen Island.
M. typhlops Lowe, 1843.		Madeira.
M. megalops Lütk., 1877.		South of the Azores.
M. crassiceps Günt., 1878.	675–1500 C.	Off Pernambuco in Mid. Atl.; betw. Cape Good Hope and New Guinea; N. of New Guinea.
* *M.* mizolepis Günt., 1887.	800–1573 C., A.	S. of New Guinea, C.; Bay of Bengal, I.; off coasts of Colombia, A.
M. robustus Günt., 1887.	1850 C.	Southwest of Sierra Leone.
M. suborbitalis Gill, 1884.	1149–1800 B., A.	Lat. 38° N., Lon. 69° W.
M. Beanii Günt., 1887.	2949 A.	Lat. 37° N., Lon. 73° W.
M. cocles Vaill., 1888.	1998 T.	Off the Cape Verdes.
* *M. lugubris* Gilb., 1890.	822–2232 A.	Coasts of California to the Galapagos.
M. cristiceps Gilb., 1890.	859 A.	Coasts of Oregon and Washington.
* *M. nigrofulvus* Garm.	1793 A.	Gulf of Panama.
* *M. maxillaris* Garm.	1573 A.	Off Colombia.
* *M. frontosus* Garm.	852–955 A.	Off Pacific coasts of Mexico.
Melamphaës sp. Alc., 1891.	1644–1803 I.	Bay of Bengal.
* Malacosarcus Günt.		
M. macrostoma Günt., 1878.	2350 C.	Near the Low Archipelago.
Stephanoberyx Gill.		
S. monæ Gill, 1883.	1253 A.	Lat. 41° N., Lon. 65° W.
S. Gillii G. B., 1896.	2949 A.	Gulf Stream, Lat. 37° N., Lon. 73° W.
Beryx Cuv.		
B. decadactylus C. V.	345–400 C.	Off Inosima, Japan; off northern Europe.

	Range in Depth. Fathoms.	Principal Localities.
B. splendens Lowe, 1833.	150–427	Madeira; northwestern Atlantic.
Polymixia Lowe.		
P. japonica Günt., 1877.	345 C.	Off Inosima, Japan.
Poromitra G. B.		
P. capito G. B., 1883.	1632 A.	Lat. 34° N., Lon. 75° W.
Myripristis Cuv.		
M. Kaianus Günt., 1880.	140 C.	Ki Islands.
Bathyclupea Alc.		
B. Hoskynii Alc., 1891.	145–250 I.	Andaman Sea; off Madras coasts.
B. argentea G. B., 1896.	365 B.	Nevis Island, W. I.
Scombroidei.		
Ruvettus Cocco.		
R. pretiosus Cocco, 1829.	300–400	North Atlantic.
Thyrsites C. V.		
T. prometheus C. V., 1831.		Madeira.
T. prometheoides Bleek., 1856.		Sea of Amboyna.
T. Solandri C. V., 1831.		Coast of New Holland.
T. lepidopoides Less., 1830.		Coast of Brazil.
T. violaceus Bean, 1881.	125	Off Newfoundland.
T. bengalensis Alc., 1894.	145–250 I.	Bay of Bengal.
Epinnula Poey.		
E. magistralis Poey, 1854.		Caribbean Sea.
Nesiarchus Johns.		
N. nasutus Johns., 1865.	300	Off Portugal.
Nealotus Johns.		
N. tripes Johns., 1865.	2675 C.	Lat. 35° N., Lon. 68° 30′ W.
Gempylus C. V.		
G. serpens Cuv., 1829.	150	North Atlantic.
* *G. thyrsitoides* Less., 1830.		North Pacific; off Cocos Islands.
Evoxymetopon Poey.		
E. tæniatus Poey, 1863.		Havana.
E. Poeyi Günt., 1887.		South Indian Ocean.
Aphanopus Lowe.		
A. carbo Lowe, 1839.	300	Portugal.
A. minor Coll., 1886.	125	East of Greenland; Norway.
Lepidopus Gouan.		
L. caudatus Euphr., 1791.		Northeastern Atlantic.
L. elongatus Clarke, 1877.		New Zealand.
L. tenuis Günt., 1877.	345 C.	Off Inosima, Japan.
L. atlanticus G. B., 1896.	208 B.	Off St. Christopher's, W. I.
Trichiurus Linn.		
T. lepturus Linn., 1758.	345 C.	Off Japan.
* *T. nitens* Garm.	210–322 A.	Off Gulf of Panama.
Anomalops Kner.		
A. palpebratus Bodd., 1793.		Fiji Islands; Amboyna; Manado; Paumotu [Archipelago.
Bathyseriola Alc.		
B. cyanea Alc., 1890.	98–276 I.	Coromandel coast.
Cyttus Günt.		
C. abbreviatus Hect., 1875.	400 C.	Off Cape Farewell.
Antigonia Lowe.		
A. capros Lowe, 1843.	296–320 I.	North Atlantic; northwest Pacific; Ceylon.
Diretmus Johns.		
D. argenteus Johns., 1863.	604 T.	Madeira; off Morocco.
D. aureus Camp., 1879.		New Zealand.

	Range in Depth. Fathoms.	Principal Localities.
Trachinoidei.		
Champsodon Günt.		
C. vorax Günt., 1867.	115–152 C.	Western Pacific.
Bembrops Steind.		
B. caudimacula Steind., 1877.	107 I.	Madras coasts.
B. gobioides Goode, 1880.	68–324 A.	Off eastern coasts United States.
B. platyrhynchus Alc., 1893.	128 I.	Madras coasts.
Chiasmodon Johns.		
C. niger Johns., 1863.	1500 C.	Madeira; West Indies; off east coast U. S.; [mid Atlantic.
C. vastator Alc., 1890.	690–920 I.	Madras coasts.
* *C. subniger* Garm.	919 A.	Coasts of Mexico.
Notothenia Rich.		
N. mizops Günt., 1880.	120 C.	Kerguelen Islands.
N. longipes Steind., 1876.	–345 C.	Messier Channel.
Bathydraco Günt.		
B. atlanticus Günt., 1880.	1260 C.	South of Heard Island.
Aphritis C. V.		
A. gobio Günt., 1878.	147 C.	Southern coasts of South America.
Acanthaphritis Günt.		
A. grandisquamis Günt., 1880.	152 C.	Ki and Admiralty Islands.
Uranoscopus Linn.		
U. Kaianus Günt., 1880.	140 C.	Ki Islands.
Kathetostoma Günt.		
* *K. averruncus* J. B., 1889.	56–210 A.	Gulf of Panama.
Lophioidei.		
Lophius Linn.		
L. piscatorius Linn., 1758.	–415	Off New England; European coasts.
Lophiomus Gill.		
* *L. caulinaris* Garm.	127–153 A.	Gulf of Panama.
* *L. spilurus* Garm.	210–259 A.	" "
L. Naresii Günt., 1880.	150 C.	Philippines to New Guinea.
L. lugubris Alc., 1894.	142–400 I.	Off Colombo, Ceylon.
L. mutilus Alc., 1893.	128 I.	Off Madras coasts.
Aegæonichthys Clarke.		
A. Appelii Clarke, 1878.		New Zealand.
Himantolophus Rein.		
H. grœnlandicus Rein., 1837.		Mid North Atlantic.
H. Reinhardtii Lütk., 1880.		Mid North Atlantic.
Diceratias Günt.		
D. bispinosus Günt., 1887.	360–636 C., I.	Banda Island; Laccadive Sea.
Ceratias Kröy.		
C. Hölböllii Kröy., 1874.		Off Greenland and Nova Scotia.
C. carunculatus Günt., 1887.	345 C.	South of Yedo, Japan.
Caulophryne G. B.		
C. Jordani G. B., 1896.	1276 A.	Gulf Stream, east of New York.
Mancalias Gill.		
M. uranoscopus Murr., 1878.	2400 C.	Off the Canaries and the Cape Verdes.
M. Shufeldtii Gill, 1883.	372 F.	Off Martha's Vineyard.
Cryptopsaras Gill.		
C. Couesii Gill, 1883.	1686 A.	Gulf Stream, east of New York.
Oneirodes Lütk.		
O. Eschrichtii Lütk., 1871.		Off Greenland.

	Range in Depth. Fathoms.	Principal Localities.
Paroneirodes Alc.		
P. glomerosus Alc., 1890.	1260 I.	Off Madras coasts.
Melanocetus Günt.		
M. Johnsoni Günt., 1864.	2618 T.	Madeira; off Northern Africa.
M. (*Liocetus*) *Murrayi* Günt., 1887.	1850–2450 C.	Between the Cape Verde Islands and St. Paul's Rocks.
Dolopichthys Garm.		
* *D. allector* Garm.	770 A.	Off the Cocos Islands.
Linophryne Coll.		
L. lucifer Coll., 1886.		Northwest of Madeira.
Chaunax Lowe.		
C. pictus Lowe, 1849.	130–428 A.	Off east coast United States; off Madeira; off Soudan.
C. fimbriatus Hilg., 1879.		Japan.
C. Nuttingii Garm., 1896.	120	Between Cuba and Florida.
* *C. coloratus* Garm.	978 A.	Off the Cocos Islands.
C. pictus Günt., 1887.	315–272 C., I.	Fiji Islands; Bay of Bengal.
Halieutella G. B.		
H. lappa G. B., 1882.	125 F.	Gulf Stream, off New England.
Oncocephalus Fisch.		
* *O. porrectus* Garm.	66 A.	Off the Cocos Islands.
* *O.* (*Zalieutes*) *elater* J. G., 1881.	56–182 A.	Off Panama.
Halieutichthys Poey.		
H. caribbaeus Garm., 1896.	70–150 B.	West Indies and off the eastern United States in the Gulf Stream.
Halieutæa C. V.		
H. stellata Wahl., 1797.		China and Japan.
H. coccinea Alc., 1889.	265 I.	Andaman Sea.
H. nigra Alc., 1891.	188–220 I.	Andaman Sea.
H. fumosa Alc., 1894.	145–250 I.	Bay of Bengal.
Halieutopsis Garm.		
* *H. tumifrons* Garm.	1322–1360	Off the Galapagos.
Dibranchus Pet.		
D. atlanticus Pet., 1875.	73–523 B., A.	Gulf Stream in northwest Atlantic; Cape Verdes.
D. micropus Alc., 1891.	406–902 I.	Off Travancore; off Cape Comorin.
D. nasutus Alc., 1891.	188–406 I.	Andaman Sea; off Travancore.
* *D. hystrix* Garm.	1175–1270 A.	Off Colombia; Gulf of Panama.
* *D. scaber* Garm.	902–995 A.	Off Cocos Islands and Mexico.
* *D. asper* Garm.	660 A.	Off coasts of Mexico.
Dibranchopsis Garm.		
* *D. spongiosa* Gilb., 1890.	460–680 A.	" " " "
Dibranchichthys Garm.		
* *D. nudiromer* Garm.	695–730 A.	Off coasts of Colombia.
Malthopsis Alc.		
M. lutea Alc., 1891.	185–405 I.	Andaman Sea.
M. mitriger G. C., 1896.	295–310 A.	Near Hawaiian Islands.
* *M. sparsa* Garm.	242–322 A.	Off coast of Colombia.
* *M. erinacea* Garm.	421–680 A.	Gulf of Panama; Galapagos; off coasts of Mexico.
* *M. spinulosa* Garm.	511 A.	Off coast of Colombia.
* *M. spinosa* Garm.	1020–1270 A.	" " "
Halicmetus Alc.		
H. ruber Alc., 1891.	188–406 I.	Andaman Sea and coast of Travancore.

	Range in Depth. Fathoms.	Principal Localities.
Cottoidei.		
COTTUNCULUS Coll.		
C. microps Coll., 1874.	122–817 A., T.	Off New England and off European coasts.
C. Thomsoni Günt., 1882.	105–912 A., Ing.	Off New England; off European coasts; off Soudan.
C. inermis Vaill., 1888.	508–957 T., Ing.	Off Soudan; between Iceland and Jan Mayen.
COTTUS Art.		
C. bathybius Günt., 1887.	565 C.	South of Yedo, Japan.
MALACOCOTTUS Bean.		
M. zonurus Bean, 1890.	159 A.	Off Alaska.
ZESTICELUS J. E.		
Z. profundorum Gilb., 1896.	399–664 A.	Bering Sea.
ARTEDIELLUS Jord.		
A. uncinatus Rein., 1833.	40–300 F., A.	North Atlantic, eastern and western.
ICELUS Kröy.		
I. bicornis Rein., 1833.	50–250	Northeastern Atlantic.
I. scutiger Bean, 1890.	159 A.	Off Alaska.
I. euryops Bean, 1890.	159 A.	" "
I. spiniger Gilb., 1896.	–121 A.	" "
I. vicinalis Gilb., 1896.	109–406 A.	" "
I. canaliculatus Gilb., 1896.	399 A.	Off Unalaska.
ICELINUS Jord.		
I. filamentosus Gilb., 1890.	55–145 A.	Off California.
I. tenuis Gilb., 1890.	45–150 A.	" "
I. fimbriatus Gilb., 1890.	36–145 A.	" "
I. oculatus Gilb., 1890.	124 A.	" "
I. borealis Gilb., 1896.	121 A.	Off Aleutian Islands.
TRIGLOPS Rein.		
T. pingelii Rein., 1838.	263	Eastern and western North Atlantic.
T. scepticus Gilb., 1896.	43–138 A.	Off Alaska.
TRIGLA Art.		
T. leptacanthus Günt., 1880.	140 C.	Ki Islands.
T. hemisticta Schl., 1850.	98–102 I.	Off Madras coasts.
T. cuculus Linn., 1758.	167 T.	Gulf of Gascony.
T. lyra Linn., 1758.	224 T.	" " "
T. cavillone LaC., 1802.	194 T.	Off northwestern Africa.
LEPIDOTRIGLA Günt.		
L. spilopterus Günt., 1880.	140 C.	Ki Islands.
PSYCHROLUTES Günt.		
P. zebra Bean, 1890.	110 A.	Off Alaska.
Trigloidei.		
PERISTEDIUM LaC.		
P. Murrayi Günt., 1880.	188–220 I.	Sea of Banda; Andaman Sea.
P. molluccense Bleek., 1850.	140 C.	Ki Islands.
P. liorhynchus Günt., 1880.	152 C.	Admiralty Islands.
P. truncatum Günt., 1880.	"30 or 350" C.	Off Pernambuco.
P. Rivers-Andersoni Alc., 1894.	142–400 I.	Off Colombo, Ceylon.
P. investigatoris Alc., 1898.	188–405 I.	Andaman Sea.
P. serrulatum Alc., 1898.	185 I.	Andaman Sea.
P. longispatha G. B., 1896.	209–324 B.	West Indies.
P. gracile G. B., 1886.	142 B.	Gulf of Mexico.
P. platycephalum G. B., 1886.	123–288 B.	West Indies.

	Range in Depth. Fathoms.	Principal Localities.
P. miniatum Goode, 1881.	115–192	Gulf Stream in northwest Atlantic.
* *P. barbiger* Garm.	56-127 A.	Gulf of Panama.
* *P. crustosum* Garm.	100–182 A.	Off the Gulf of Panama.
Agonus Bl. S.		
A. decagonus B. S., 1801.	50–729 Ing.	North Atlantic, to Davis Straits and Jan Mayen.
Bathyagonus Gilb.		
B. nigripinnis Gilb., 1890.	350–477 A.	Off coasts of Washington to Bering Sea.
Xenochirus Gilb.		
X. pentacanthus Gilb., 1890.	70–339 A.	Off coasts of California to Bering Sea.
X. alascanus Gilb., 1896.	56–138 A.	Aleutian Islands.
X. latifrons Gilb., 1890.	50–204 A.	Off Coasts of California to Oregon.
X. triacanthus Gilb., 1890.	47–204 A.	" " "
Odontopyxis Lock.		
O. frenatus Gilb., 1896.	–351 A.	Off Alaska.
Aspidophoroides LaC.		
A. Bartoni Gilb., 1896.	–121 A.	Off Alaska.
Cyclopteroidei.		
Eumicrotremus Gill.		
E. spinosus Müll., 1777.	129	Eastern and western North Atlantic.
Liparis Art.		
L. liparis Linn., 1766.	180	North Atlantic.
L. minor Fabr., 1780.	46–106	" "
L. (*Careliparis*) *Agassizii* Put., 1874.		Bering Sea.
Careproctus Kröy.		
C. gelatinosus Pall., 1769.	110	Northern Pacific.
C. glutinosus Rein., 1843.	263-658 Ing.	Northern Atlantic.
C. melanurus Gilb., 1891.	178–339 A.	Western coast United States.
C. Edwardsi Vaill., 1888.	721 T.	Coasts of Morocco.
* *C. longifilis* Garm., 1892.	1823 A.	West of Malpelo Island.
C. simus Gilb., 1896.	350 A.	South of Alaska.
C. ostentum Gilb., 1896.	105–350 A.	North of Unalaska.
C. ectenes Gilb., 1896.	350 A.	Off Unalaska.
C. micropus Günt., 1887.	55–976 Ing.	Faröes to Jan Mayen and Davis Straits.
C. Collettii Gilb., 1896.	625	South of Alaska.
Prognurus J. E.		
P. cypselurus J. E., 1898.	664–877 A.	Coast of Washington; Bogoslof Island.
Bathyphasma Gilb.		
B. oviger Gilb., 1896.	1588 A.	Off Queen Charlotte's Island.
Gyrinichthys Gilb.		
G. minytremus Gilb., 1896.	350 A.	North of Unalaska.
Paraliparis Coll.,		
P. bathybius Coll., 1878.	568–1010 N., Ing.	West of Bear Island; Faröes to Jan Mayen [and Greenland.
P. liparinus Goode, 1881.	487	Off New England.
P. membranaceus Günt., 1887.	400 C.	Off Cape St. Vincent.
P. cephalus Gilb, 1891.	284–685 A.	Off California and Oregon to Bering Sea.
P. rosaceus Gilb., 1890.	984 A.	Off west coast of Mexico.
P. mento Gilb., 1891.	685 A.	Off coast of Oregon.
* *P. fimbriatus* Garm., 1892.	1772 A.	Off Gulf of Panama.
* *P. grandiceps* Garm.	1588 A.	Gulf of California.
* *P. attenuatus* Garm.	902 A.	Off the Cocos Islands.
* *P. latifrons* Garm.	1793 A.	Gulf of Panama.
* *P.* (*Merophorus*) *angustifrons* Garm.	511	Off Cape Mala.

	Range in Depth. Fathoms.	Principal Localities.
P. Copii G. B., 1896 (?=*P. liparinus* Goode, 1881).	353–538 A.	Off eastern coasts United States.
P. ulochir Gilb., 1896.	406–1005 A.	Gulf of California.
P. dactylosus Gilb., 1896.	296 A.	Off Santa Cruz, California.
P. holomelas Gilb., 1896.	406–1625 A.	Off Unalaska, Bering Sea.
Rhinoliparis Gilb.		
R. barbulifer Gilb., 1896.	225–576 A.	Off Unalaska.
Gobioidei.		
Callionymus Linn.		
C. kaianus Günt., 1880.	140 C.	Ki Islands.
C. calauropomus Rich., 1848.	115 C.	Philippine Islands.
C. Phaëton Günt., 1861.	306 T.	Off the Azores.
C. lyra Linn., 1758.	224 T.	Gulf of Gascony.
C. carebares Alc., 1890.	98–102 I.	Off Madras coasts.
C. Agassizii G. B., 1888 (*C. himantophorus* G. B., 1896).	26–340 B.	West Indies and Gulf of Mexico.
* *C. atrilabiatus* Garm.	112–127 A.	Between Malpelo Island and Isthmus of Panama.
Gobius Art.		
G. Lesueurii Risso, 1826.	243 T.	Off coasts of Europe.
Bollmannia Jord.		
B. macropoma Gilb., 1891.	112 A.	Gulf of California.
Blennioidei.		
Anarrhichas Art.		
A. minor Olaf., 1772.	200	North Atlantic; off coasts of Norway.
A. latifrons S. H., 1842.	100–471	Eastern and western north Atlantic.
Chirolophis Swains.		
C. Ascanii Walb., 1792.	140–180	Off Spitzbergen.
FISTULARIIDÆ.		
Aulostoma LaC.		
"*A.? longipes*" Vaill., 1888.	635 T.	Off coasts of Morocco.
MACRORHAMPHOSIDÆ.		
Macrorhamphosus LaC.		
M. scolopax Linn., 1766.	65–128 T.	Off western coasts of Africa.
POMACENTRIDÆ.		
Heliases Cuv.		
H. roseus Günt., 1880.	140 C.	Off the Ki Islands.
ANACANTHINI.		
Zoarcoidei.		
Lycodes Rein.		
L. reticulatus Rein., 1838.	–140	Off N. E. coasts U. S. and N. W. coasts Europe.
L. Esmarkii Coll., 1880.	224–459	Off N. E. coasts U. S. and N. W. coasts Europe.
L. Lütkenii Coll., 1880.	371–459	Jan Mayen to Kara Sea.
L. frigidus Coll., 1880.	260–1423.	Off northeast coasts U. S. and off Spitzbergen.
L. pallidus Coll., 1880.	46–957	Northern Europe to Kara Sea.
L seminudus Rein., 1838.	260	Northeastern Atlantic.
L. muræna Coll., 1878.	350–658	Both sides of northern Atlantic.
L. Sarsii Coll., 1872.	100–311	Off coasts of New England and in N. E. Atlantic.
L. Verrillii G. B., 1877.	36–603 B.	" " " "
L. paxillus G. B., 1879.	263–904 B., A.	" " " "

	Range in Depth. Fathoms.	Principal Localities.
L. zoarchus G. B., 1896.	130–190 A.	Off Nova Scotia.
L. brevipes Bean, 1890.	58–531 A.	Off Alaska.
L. porifer Gilb., 1890.	857 A.	Off Lower California.
L. diapterus Gilb., 1891.	82–376 A.	Off coasts Oregon.
L. macrops Günt., 1880.	40–140 C.	Straits of Magellan.
L. albus Vaill., 1888.	2173 T.	Off coasts of Southern Europe.
L. macrops Vaill., 1888.	817 T.	Bank of Arguin.
L. mucosus Vaill., 1888.	672 T.	" " "
L. concolor G. T., 1897.	276 A.	Bering Sea.
* *L. serpens* Garm.	905 A.	Gulf of California; south of Guaymas.
* *L. anguis* Garm.	800–859 A.	Gulf of California.
* *L. incisus* Garm.	695 A.	Off Cape Mala.
* *L. cicatrifer* Garm.	1672 A.	Off Mariato Point.
LYCONEMA Gilb.		
L. barbatum Gilb., 1896.	204 A.	Off coast of California.
APRODON Gilb.		
A. Corteziana Gilb., 1890.	191–339 A.	Off coast of California.
LYCODOPSIS Coll.		
L. crotalinus Gilb., 1890.	483–603 A.	Off coasts of California.
L. crassilabris Gilb., 1890.	414 A.	Off southern California.
* *L. scaurus* Garm.	458 A.	Gulf of Panama.
LYCODONUS G. B.		
L. mirabilis G. B., 1883.	721–1309 B.	Off east coasts of United States.
PHUCOCOETES Rich.		
* *P. suspectus* Garm.	660 A.	Off Acapulco, Mexico.
GYMNELIS Rein.		
G. viridis Fabr., 1780.	55–263 Ing.	Northeast Atlantic; Davis Straits.
* *G. conorhynchus* Garm.	1793 A.	Off Cape Mala.
BOTHROCAROPSIS Garm.		
* *B. alalonga* Garm.	905 A.	Gulf of California.
* *B. elongata* Garm.	695–1020 A.	Off the Gulf of Panama.
* *B. rictolata* Garm.	695 A.	Off Mariato Point.
BOTHROCARA Bean.		
B. mollis Bean, 1890.	316–876 A.	Off Q. Charlotte's Island to South California.
B. pusilla Bean, 1890.	121–351 A.	Off Aleutian Islands.
MAYNEA Cunn.		
* *M. bulbiceps* Garm.	1471 A.	Eastward of the Cocos Islands.
MELANOSTIGMA Günt.		
M. gelatinosum Günt., 1881.		Straits of Magellan.
M. gelatinosum G. B., 1883.	319–641 F., A.	Off Massachusetts.
M. pamelas Gilb., 1896.	382–456 A.	Off Alaska.
LYCODAPUS Gilb.		
* *L. fierasfer* Gilb., 1890.	109–1005 A.	Alaska to the Gulf of Panama.
L. dermatinus Gilb., 1896.	552 A.	Alaska.
L. parviceps Gilb., 1896.	109 A.	Alaska, off Unalaska.
L. extensus Gilb., 1896.	109 A.	" " "
Otophidioidei.		
DEREPODICHTHYS Gilb.		
D. alepidotus Gilb., 1896.	1588 A.	Off Q. Charlotte's Island.
LEPOPHIDIUM Gill.		
L. cervinum G. B., 1885.	56–120	S. E. coasts United States to the Caribbean Sea.
L. marmoratum G. B., 1885.	213 A.	Caribbean Sea.

	Range in Depth. Fathoms.	Principal Localities.
* *L. emmelas* Gilb., 1890.	141–511 A.	Off coasts of Central America and Mexico.
L. stigmatistium Gilb., 1890.	112 A.	Off Lower California.
L. microlepis Gilb., 1890.	76–145 A.	Off western coasts of Mexico.
Otophidium Gill.		
O. murænolepis Günt., 1880.	140 C.	Ki Islands.
Brotuloidei.		
Neobythites G. B.		
N. grandis Günt., 1877.	1875 C.	Near Yokohama; Japan.
N. macrops Günt., 1887.	188–375 I., C.	Andaman Sea; off the Fijis and the Philippines.
N. Gillii G. B., 1886.	111 B.	Gulf of Mexico.
N. marginatus G. B., 1883.	209 B.	Off Barbados.
N. steatiticus Alc., 1893.	107–250 I.	Off Madras coast.
N. pterotus Alc., 1891.	100–1748 I.	Bay of Bengal; Laccadive Sea.
N. squamipinnis Alc., 1889.	193–250 I.	Bay of Bengal.
N. crassus Vaill., 1888.	2326 T.	Lat. 44° 20′ N., Lon. 17° 11′ W.
Barathrodemus G. B.		
B. manatinus G. B., 1883.	647–1395 B., A.	Gulf Stream, off North Carolina.
Glyptophidium Alc.		
G. argenteum Alc., 1889.	271–406 I.	Andaman Sea; off Travancore.
G. macropus Alc., 1894.	145–250 I.	Bay of Bengal.
Leucicorus Garm.		
* *L. lusciosus* Garm.	1879 A.	Southwest of Acapulco, Mexico.
Nematonus Günt.		
N. pectoralis G. B., 1886.	330–1430 B.	Off Dominica; Gulf of Mexico.
Mixonus Günt.		
M. laticeps Günt., 1878.	2500–1749 C., T.	Mid Atlantic; off Cape Palmas.
* *M. caudalis* Garm.	1322–1667.	West of Malpelo; east of the Cocos Islands; east of Chatham Island.
Pteroidonus Günt.		
P. quinquarius Günt., 1887.	565 C.	Off Japan.
Dicrolene G. B.		
D. intronigra G. B., 1883.	464–983 B., A.	Off South Carolina; off northwest Africa.
* *D. filamentosa* Garm.	511–1020 A.	Off Mariato Point; off Cape Mala; off Acapulco.
* *D. nigra* Garm.	421–1020 A.	Off Malpelo Island; Gulf of Panama; off Chatham Island.
* *D. pullata* Garm.	730 A.	Lat. 7° 30′ 36″ N., Lon. 78° 39′ W.
D. multifilis Alc., 1889.	193–281 I.	Bay of Bengal.
D. Vaillantii Alc., 1890.	406–740 I.	Off Ceylon; Laccadive Sea.
D. nigricaudis Alc., 1891.	188–220 I.	Andaman Sea.
Alcockia G. B.		
A. rostrata Günt.,1887.	2150 C.	North of Celebes.
Porogadus G. B.		
P. miles G. B., 1886.	1168 A.	Off South Carolina.
P. gracilis Günt., 1878.	1400 C.	South of New Guinea.
* *P. longiceps* Garm.	134–1793.	Panamic region of the Pacific.
* *P. atripectus* Garm.	772–1293 A.	Off Acapulco; Gulf of Panama; off the Cocos Islands.
* *P. breviceps* Garm.	859–905 A.	Gulf of California.
P. Macdonaldi G. B., 1896.	1631 A.	Gulf Stream, Lat. 38° 29′ 30″ N., Lon. 70° 57′ W.
P. nudus Vaill., 1888.	1270–1749 T.	Off northwestern Africa.
P. subarmatus Vaill., 1888.	1749 T.	Off the Cape Verde Islands.
P. promelas Gilb., 1891.	1005 A.	Gulf of California.

	Range in Depth. Fathoms.	Principal Localities.
Dermatorus Alc.		
D. trichiurus Alc., 1890.	890–1000 I.	Off Baluchistan ; Laccadive Sea.
D. melanocephalus Alc., 1891.	1644–1748 I.	Bay of Bengal.
D. melampeplus Alc., 1896.	931 I.	Laccadive Sea.
Monomitopus Alc.		
M. nigripinnis Alc., 1889.	490–891 I.	Andaman Sea; Bay of Bengal; Laccadive Sea.
M. conjugator Alc., 1896.	296–406 I.	Off Ceylon ; off Travancore.
M. Agassizii G. B., 1896.	26–291 B.	Off Granada Island, W. I.
M. metriostomus Vaill., 1888.	672–788 T.	Off northwestern Africa.
M. microphthalmus Vaill., 1888.	1749 T.	Off the Cape Verde Islands.
* *M. torvus* Garm.	458–555 A.	Off Mariato Point; Gulf of Panama.
Monomeropus.		
* *M. malispinosus* Garm.	1020 A.	Gulf of Panama.
Benthocometes G. B.		
B. robustus G. B., 1886.	130–400 B.	Off Havana and northward, in the Gulf Stream.
Diplacanthopoma Günt.		
D. brachysoma Günt., 1887.	350 C.	Off Pernambuco.
D. Rivers-Andersoni Alc., 1895.	947 I.	Off the Indus Delta.
D. brachysoma Alc., 1889.	490 I.	Andaman Sea.
D. raniceps Alc., 1898.	405 I.	Andaman Sea.
D. murænolepis Vaill., 1888.	224 T.	Off the coast of Soudan.
* *D. Jordani* Garm.	385 A.	Off Chatham Island, Galapagos.
Bassozetus Gill.		
B. tænia Günt., 1878.	1050–1500 C.	Mid Atlantic.
B. normalis Gill., 1883.	1131–1920 B.	West Indies.
B catena G. B., 1886.	1467 B.	Gulf of Mexico.
B. glutinosus Alc., 1890.	1310 I.	Off Madras coasts.
B. compressus Günt., 1887.	1050–1400 C.	Southeast of New Guinea ; off the Philippines.
* *B. nasus* Garm.	1672–1879 A.	S. W. of Mariato Point ; N. E. of Malpelo Island; S. E. of Acapulco.
Bassogigas Gill.		
B. Gillii G. B., 1886.	1106 A.	Off Delaware.
* *B stelliferoides* Gilb., 1891.	112–210 A.	Off coasts of Lower California to 7° N. latitude.
Holcomycteronus Garm.		
* *H. digittatus* Garm.	1201–2322 A.	West of Malpelo; Gulf of California.
Eretmichthys Garm.		
* *E. pinnatus* Garm.	978–1322 A.	Off Cocos Islands; east of Chatham Island.
* *E. ocella* Garm.	1270 A.	Gulf of Panama.
Cataetyx Günt.		
C. Messieri Günt., 1878.	345 C.	Messier Channel.
C. rubrirostris Gilb., 1890.	205–359 A.	Off coasts of California.
* *C. simus* Garm.	1270–1471 A.	East of Cocos Islands ; E. of Galapagos Island; [Gulf of Panama.
Barathronus G. B.		
B. bicolor G. B., 1896.	769 B.	Off Guadaloupe, W. I.
Saccogaster Alc.		
S. maculata Alc., 1889.	145–250 I.	Bay of Bengal.
Pseudonus Garm.		
* *P. acutus* Garm.	885 A.	East of James Island, Galapagos Arch.
Hephthocara Alc.		
H. simus Alc., 1892.	902 I.	Gulf of Manaar.
Alexeterion Vaill.		
A. Parfaiti Vaill., 1888.	2736 T.	Lat. 44° 21′ N., Lon. 13° 33′ W.
Aphyonus Günt.		
A. gelatinosus Günt., 1878.	1400 C.	Between Australia and New Guinea.

	Range in Depth. Fathoms.	Principal Localities.
A. mollis G. B., 1883.	955 B.	Gulf of Mexico.
TYPHLONUS Günt.		
T. nasus Günt., 1878.	2150–2440	North of Celebes; northeast of Australia.
TAUREDOPHIDIUM Alc.		
T. Hextii Alc., 1890.	1310 I.	Off Madras coasts.
ACANTHONUS Günt.		
A. armatus Günt., 1878.	1050–1070 C.	North of New Guinea ; Philippines.
* *A. spinifer* Garm.	1772 A.	Northeast of Malpelo Island.
LAMPROGRAMMUS Alc.		
L. niger Alc., 1891.	406–561 I.	Andaman Sea ; Bay of Bengal.
L. fragilis Alc., 1892.	406–678 I.	Off Travancore; Bay of Bengal.
* *L. illustris* Garm.	511–555 A.	Off Cape Mala; Gulf of Panama.
RHODICHTHYS Coll.		
R. regina Coll., 1878.	762–1280 N.	Between Finmark and Jan Mayen and Bear Islands; east of Iceland ; Faröes.
SCIADONUS Garm.		
* *S. pedicellaris* Garm.	1010 A.	East of the Cocos Islands.
Gadoidei.		
MELANONUS Günt.		
M. gracilis Günt., 1878.	1957 C.	Antarctic Ocean, Lat. 62° 26′ S., Lon. 95° 44′ E.
BROSMICULUS Vaill.		
B. imberbis Vaill., 1888.	251 T.	Off the Cape Verde Islands.
B. incognitus Garm.	365 B.	Off Nevis Island. (= Uraleptus maraldi G. B., 1896, Oc. Ich. fig. 320)
MICROLEPIDIUM Garm.		
* *M. grandiceps* Garm.	1421 A.	Gulf of California.
M. verecundum Gilb., 1896.	364 A.	Off Revilla Gigedos Islands.
LEPTOPHYCIS Garm.		
* *L. filifer* Garm.	311–385 A.	Galapagos Archipelago.
URALEPTUS Costa.		
U. Maraldi Risso, 1810.	170	Mediterranean to Madeira.
HALARGYREUS Günt.		
H. Johnsoni Günt., 1862.		Madeira.
H. brevipes Vaill., 1888.	721 T.	Off Morocco.
MERLUCCIUS Raf.		
M. merluccius Linn., 1758.	54–349 T.	Coasts of Europe.
M. bilinearis Mitch., 1814.	11–296	Off eastern coasts United States.
* *M. angustimanus* Garm.	127–286 A.	Off the Gulf of Panama.
GADUS Art.		
G. morhua Linn., 1758.	40–250	Northern Atlantic.
G. macrocephalus Tiles., 1810.	17–128 A.	Bering Sea.
G. æglefinus Linn., 1758.	–499.	North Atlantic.
G. argenteus Guich., 1850.	183–300 T.	Off European coasts to those of the Soudan.
G. poutassou Risso, 1826.	328 W.	Gulf of Genoa.
MORA Risso.		
M. moro Risso, 1810.	340–747 T.	Mediterranean and neighboring Atlantic.
LEPIDION Swains.		
L. lepidion Risso, 1810.	100–600	Mediterranean Sea.
L. eques Günt., 1887.	295–530 Ing., K.	Southwest of Iceland ; Faröe Channel.
L. ensiferus Günt., 1887.	600 C.	Mouth of La Plata river.
L. inosimæ Günt., 1887.	345 C.	Off Inosima, Japan.
ANTIMORA Günt.		
A. rostrata Günt., 1878.	600–1375 C.	Southwestern Atlantic and southwestern Indian Ocean.
A. viola G. B., 1879.	306–1434 A.	Off E. coast U. S. ; Faröes to Denmark Strait.

	Range in Depth. Fathoms.	Principal Localities.
A. microlepis Bean, 1890.	316–1588 A.	Bering Sea; off Q. Charlotte's Island; off California.
* *A. rhina* Garm.	695–1020	Gulf of Panama.
Læmonema Günt.		
L. robustum Günt., 1862.	251–257 T.	Off northwestern Africa.
L. barbatulum G. B., 1883.	225–310 B.	Off east coasts United States.
L. melanurum G. B., 1896.	208–1467 B.	Off east and south coasts United States.
* *L. gracillipes* Garm.	182–331 A.	Gulf of Panama and Galapagos.
Lotella Kaup.		
L. marginata Günt., 1878.	125–345 C.	Magellan's Straits.
L. maxillaris Bean, 1890.	396 A.	Off Queen Charlotte's Island.
Phycicculus Kaup.		
P. Dalwigkii Kaup, 1858.	349–427 T.	Off northwestern Africa.
P. japonicus Hilg., 1879.	345 C.	Off Inosima, Japan.
P. roseus Alc., 1891.	188–220 I.	Andaman Sea.
P. argyropastus Alc., 1893.	128–217 I.	Off Madras and Ceylon.
P. fulvus Bean., 1884.	79–955 F., B.	Off eastern coasts of the U. S. to the West Indies.
* *P. longipes* Garm.	127–695 A.	Gulf of Panama.
* *P. rastrelliger* Gilb., 1890.	85–286 A.	Off the coasts of Colombia.
P. nematopus Gilb., 1890.	77–221 A.	" " " "
Phycis Art.		
P. phycis Linn., 1766.	335 T.	Mediterranean and neighboring Atlantic.
P. blennoides Brunn., 1768.	70–200	Off European to northwest African coasts.
P. regius Walb., 1792.	43–233 B.	Off Eastern United States.
P. chuss Walb., 1792.	300	" " " "
P. Chesteri G. B., 1878.	32–538 A.	" " " "
P. tenuis Mitch., 1814.	134–304 B.	" " " "
P. cirratus G. B., 1896.	210–324 A.	Gulf of Mexico.
Molva Nilss.		
M. molva Linn., 1758.	80–150	Norwegian coasts.
M. byrkelange Walb., 1792.	80–300	Off north European coasts.
Brosmius Cuv.		
B. brosme Müll., 1776.	30–530 K.	Northeastern Atlantic.
Gaidropsarus Raf.		
G. vulgaris Yarr., 1836.	61–349	Off European to northwest African coast.
G. septentrionalis Coll., 1874.	20–150	Norwegian coasts.
G. ensis Rein., 1838.	858–1106 A.	Off east coasts North America to Greenland.
G. Reinhardtii Coll., 1878.	262–1236 Ing.	Northeastern Atlantic.
G. Carpenteri Günt., 1887.	180 P.	Faröes.
G. biscayensis Coll., 1890.	84–213 H.	Gulf of Gascony; Cape Finisterre.
G. cimbrius Linn., 1766.	724 F.	North Atlantic; off east coast United States.
G. macrophthalmus Günt., 1867.	80–180	Off the Hebrides.
Bregmaceros Thomps.		
B. Macclellandi Thomps., 1840.	128 I.	Bengal.
B. atlanticus G. B., 1886.	90–305 B.	Off the West Indies.
* *B. longipes* Garm.	94 A.	Off Acapulco.
Macruroidei.		
Bathygadus Günt.		
B. cottoides Günt., 1878.	410–700 I., C.	Off New Zealand; Kermadec Islands; Bay of Bengal.
B. multifilis Günt., 1887.	500 C.	South of the Philippines.
B. longifilis G. B., 1885.	525–894 A., T.	Gulf of Mexico; coasts of Morocco.
B. macrops G. B., 1885.	321–347 B., A.	Gulf of Mexico.

	Range in Depth. Fathoms.	Principal Localities.
B. favosus G. B., 1886.	420–1501 A., B.	Off east coast United States; off Martinique, West Indies.
B. arcuatus G. B., 1886.	334–476 B.	West Indies and Gulf of Mexico.
B. cavernosus G. B., 1885.	227 B.	Gulf of Mexico.
B. dispar Vaill., 1888.	604 T.	Coasts of Morocco.
B. melanobranchus Vaill., 1888.	456–869 T.	Off northwestern Africa.
B. longifilis Alc., 1890.	683–740 I.	Off Maldive Atoll.
B. furvescens Alc., 1894.	719 I.	" " "
Hymenocephalus Gigl.		
H. italicus Gigl., 1884.	224–1139 T.	Off the coasts of Morocco.
H. longibarbis Günt., 1887.	315 C.	Off the Fiji Islands.
H. heterolepis Alc., 1889.	188–271 I.	Gulf of Manaar; off the Andamans.
H. antræus G. C., 1896.	289–343 A.	Near the Hawaiian Islands.
H. Goodei Günt., 1887.	154–1715 A., Ing	Off New England; Davis and Denmark Straits; off Havana.
H. Ingolfi Lütk., 1898.	902–1300 Ing.	South and west of Iceland.
Cetonurus Günt.		
C. crassiceps Günt., 1878.	520–600 C.	North of the Kermadec Islands.
C. globiceps Vaill., 1888.	623–1638 T.	Off southern Europe to the Azores.
Trachonurus Günt.		
T. villosus Günt., 1877.	345–500 C.	Off Japan and the Philippines.
T. sentipellis G. C., 1896.	375 A.	Off the Hawaiian Islands.
Nematonurus Günt.		
N. armatus Hect., 1875.	400–2425 C.	Antarctic Ocean to Mid Pacific.
N. affinis Günt., 1878.	1900 C.	Off La Plata River.
N. longifilis Günt., 1877.	565 C.	South of Yedo, Japan.
N. cyclolepis Gilb., 1896.	1588 A.	Off Q. Charlotte's Island.
Chalinura G. B.		
C. leptolepis Günt., 1877.	350 C.	Off coast of Brazil.
C. Murrayi Günt., 1878.	1100 C.	Off New Zealand.
C. simula G. B., 1883.	332–1731 B. A.	Off E. coasts United States; Denmark Strait.
C. fernandeziana Günt., 1887.	1375 C.	South of Juan Fernandez.
C. liocephala Günt., 1887.	1875–2050 C.	Off Japan; Mid Pacific.
C. hispida Alc., 1889.	220–240 I.	Off west coast of the Andamans.
C. mediterranea G. B., 1896.	1533–1588 W.	Off Sardinia.
C. serrula Bean, 1890.	1569 A.	East of P. of Wales Island.
C. filifer Gilb., 1896.	1588 A.	Off Q. Charlotte's Island.
C. ctenomelas G. C., 1896.	295–343 A.	Off the Hawaiian Islands.
C. brevibarbis G. B., 1896.	956–1731 A.	Off eastern United States.
Optonurus Günt.		
O. denticulatus Rich., 1848.	275–520 C.	Off New Zealand; off the Kermadecs.
O. atherodon G. C., 1896.	298–375 A.	Off the Hawaiian Islands.
Malacocephalus Günt.		
M. lævis Lowe, 1843.	250–350 C.	Off European coasts, off Brazil.
M. lævis Alc., 1889.	188–265 I.	Andaman Sea.
M. lævis G. C., 1896.	295–351 A.	Hawaiian Islands.
M. macrochir Günt., 1877.	345 C.	Off Inosima, Japan.
M. sublævis Vaill., 1888.	76–1203 T.	Off northwestern Africa.
M. sulcatus G. B., 1886.	420–472 B.	West Indies.
M. suborbitalis G. T., 1897.	1771 A.	Bering Sea, southwest of Pribilof Island.
M. pectoralis Gilb., 1891.	685–877 A.	Off Oregon coasts.
M. Clarkii J. G., 1898.	664 A.	Bering Sea, off Pribilof Island.
M. occidentalis G. B., 1885.	132–164 B.	Off Granada, W. I.; off east coasts U. S.
* *M. bulbiceps* Garm.	978 A.	East of the Cocos Islands.

	Range in Depth. Fathoms.	Principal Localities.
Lionurus Günt.		
L. filicauda Günt., 1878.	1375–2650 C.	Southwestern Atlantic ; southeastern Pacific.
L. microlepis Günt., 1878.	315 C.	Off the Fiji Islands.
* *L. liolepis* Gilb., 1890.	456–905 A.	Gulf of California.
* *L. barbiger* Garm.	676 A.	Off west coasts of Mexico.
Coryphænoides Gunn.		
C. rupestris Gunn., 1765.	200–1245 P., Ing.	Faröes; Denmark Strait; Davis Strait; south of Iceland.
C. altipinnis Günt., 1877.	565–1875 C.	Off Japan.
C. carapinus G. B., 1883.	662–1451 A.	Off east coasts United States in Gulf Stream.
C. gigas Vaill., 1888.	2278–2327 T.	Off the coasts of Portugal.
C. asperrimus Vaill., 1888.	687–869 T.	Morocco to the Azores.
Macrurus Bloch.		
M. berglax LaC., 1802.	318–1870	Off European and east North American coasts.
M. rudis Günt., 1878.	520–630 C.	North of the Kermadecs.
M. nasutus Günt., 1877.	545–565 C.	Japan.
M. serrulatus Günt , 1878.	700 C.	Northeast of New Zealand.
M. sclerorhynchus Val., 1836.	251–1999 T.	Off northwest coasts of Africa.
M. æqualis Günt., 1878.	251–721 T.	Off Portugal; off northwest Africa.
M. Bairdii G. B., 1877.	60–1255 A.	Off eastern United States.
M. holotrachys Günt., 1878.	600 C.	Off La Plata River; off Newfoundland.
M. asper Günt., 1877.	1875 C.	South of Japan.
M. carinatus Günt., 1878.	310 C.	Off P. Edward's Island.
M. acrolepis Bean, 1883.	345–786 A.	Straits of Juan de Fuca ; Monterey Bay.
M. lepturus G. T., 1897.	1401 A.	Bering Sea, southwest of Pribilof Island.
M. zaniophorus Vaill., 1888.	454–738 T.	Off northwestern Africa.
M. japonicus Vaill., 1888.	251–1214 T.	Off northwestern Africa to Cape Verdes and to Azores.
M. Güntheri Vaill., 1888.	1090–1203 T.	Off coasts of Morocco.
M. investigatoris Alc., 1889.	188–490 I.	Andaman Sea ; Bay of Bengal.
M. Petersoni Alc., 1891.	188–220 I.	Andaman Sea.
M. semiquincunciatus Alc., 1889.	130–410 I.	Bay of Bengal.
M. brevirostris Alc., 1889.	490 I.	Andaman Sea.
M. macrolophus Alc., 1889.	240–410 I.	Bay of Bengal; off Travancore.
M. lophotes Alc., 1889.	285–405 I.	Bay of Bengal.
M. polylepis Alc., 1889.	193–272 I.	Bay of Bengal.
M. pumiliceps Alc., 1894.	719 I.	Off north Maldive Atoll.
M. Hoskynii Alc., 1890.	1310 I.	Off Madras coasts.
M. Hextii Alc., 1890.	865–1000 I.	Laccadive Sea.
M. Wood-Masoni Alc., 1890.	559–1000 I.	Laccadive Sea; Gulf of Manaar; Konkan coast.
M. stelgidolepis Gilb., 1896.	267 A.	Off Point Conception.
M. cinereus Gilb., 1896.	399–1033 A.	Bering Sea.
M. ectenes G. C., 1896.	313 A.	Off Hawaiian Islands.
M. propinquus G. C., 1896.	313–351 A.	" " "
M. holocentrus G. C., 1896.	351–375 A.	" " "
M. gibber G. C., 1896.	351–375 A.	" " "
M. hirundo Coll., 1896.	692 H.	Azores.
* *M. bucephalus* Garm.	134–1573 A.	Panamic region from Gulf of California to coasts of Colombia.
* *M. liraticeps* Garm.	885 A.	Off James Island, Galapagos Arch.
* *M. capito* Garm.	458–493 A.	Gulf of Panama ; off Acapulco.
* *M. leucophæus* Garm.	322 A.	Gulf of Panama.
* *M. boöps* Garm.	511–546 A.	Off coasts of Colombia.
* *M. fragilis* Garm.	1672–1823 A.	Off Mariato Point; S. W. of Malpelo Island.

	Range in Depth. Fathoms.	Principal Localities.
* *M. carminifer* Garm.	322–1020 A.	Gulf of Panama.
* *M. gracillicauda* Garm.	286–458 A.	Off coasts of Colombia.
* *M. orbitalis* Garm.	286 A.	East of Cape Mala.
* *M. loricatus* Garm.	327–331 A.	Off the Galapagos Islands.
* *M. cuspidatus* Garm.	905 A.	Gulf of California.
* *M. convergens* Garm.	695–1020 A.	Off Panama.
* *M. latirostratus* Garm	322–511 A.	Off western Colombia.
* *M. anguliceps* Garm.	695–1322 A.	Gulf of Panama; east of the Galapagos; Gulf of California.
* *M. latinasutus* Garm.	995 A.	Gulf of California.
* *M. trichiurus* Garm.	555 A.	Off Mariato Point.
Cœlorhynchus Giorna.		
C. parallelus Günt., 1877.	345–700 C.	Off New Zealand; Kermadec Islands; south of Japan; Gulf of Manaar.
C. japonicus Schl., 1850.	345 C.	Off Inosima, Japan.
C. australis Rich., 1839.	275 C.	Off New Zealand and Australia.
C. cœlorhynchus Risso, 1810.	306 T.	Off northern Europe; Mediterranean to Azores and Madeira.
C. carminatus Goode, 1881.	85–616 F.	Off eastern U. S. to Bahamas, in Gulf Stream.
C. fasciatus Günt., 1878.	40–245 C.	Off eastern coast of southern South America.
C. flabellispinis Alc., 1894.	719 I.	Off Maldive Atoll.
C. quadricristatus Alc., 1890.	193–410 I.	Andaman Sea.
C. occa G. B., 1885.	335 B.	Gulf of Mexico.
C. caribbæus G. B., 1885.	155–210 B.	Gulf of Mexico.
C. scaphopsis Gilb., 1890.	145 A.	Gulf of California.
C. gladius G. C., 1896.	295 A.	Hawaiian Islands.
C. acipenserinus G. C., 1896.	298–375 A.	“ “
* *C. tenuicauda* Garm.	458 A.	Gulf of Panama.
* *C. canus* Garm.	153–210 A.	Off western coast of Colombia.
Trachyrhynchus Giorna.		
T. trachyrhynchus Risso, 1810.	221–830 T.	Off northwest Africa; Med. Sea.
T. longirostris Günt., 1878.	700 C.	Northeast of New Zealand.
T. Murrayi Günt., 1887.	486–555 Ing., K.	Southwest of Iceland; Faröe Channel.
* *T. helolepis* Gilb., 1891.	392–421 A.	Near Chatham Island.
Pleuronectoidei.		
Atheresthes J. G.		
A. stomias J. G., 1880.	32–406 A.	Off San Francisco; Aleutian Islands; Bristol [Bay.
Reinhardtius Gill.		
R. hippoglossoides Walb., 1792.	127–447 A., N.	Off New England; off Bear Island, and Scandinavia.
Hippoglossus Cuv.		
H. hippoglossus Linn., 1758.	100–300	Off E. coast New England; Grand Banks; off Scandinavia; S. of Spitzbergen.
Hippoglossoides Gottsche.		
H. platessoides Fabr., 1780.	362 Ing.	Off New England coasts; on Grand Banks; off north Europe.
H. exilis J. G., 1880.	50–280 A.	Off coasts of California and northward.
Pœcilopsetta Günt.		
P. colorata Günt., 1880.	140 C.	Ki Islands.
P. maculosa Alc., 1894.	145–250 I.	Bay of Bengal.
P. prælonga Alc., 1894.	142–400 I.	Off Colombo.
Anticitharus Günt.		
A. polyspilus Günt., 1880.	140 C.	Ki Islands.

	Range in Depth. Fathoms.	Principal Localities.
Samaris Gray.		
S. maculatus Günt., 1880.	140 C.	Ki Islands.
Chascanopsetta Alc.		
C. lugubris Alc., 1894.	145–250 I.	Bay of Bengal.
Lepidopsetta Günt.		
L. maculata Günt., 1880.	310 C.	Off P. Edward's Island.
Lepidorhombus Günt.		
L. whiff-Jagonis Walb., 1792.	33–306 T.	Off Morocco and Azores.
Paralichthys Gir.		
P. oblongus Mitch., 1815.	400 A.	Off east coasts of New England.
P. Hectoris Günt., 1887.	310 C.	Off New Zealand.
P. boöps Hect.	150 C.	" " "
P. ocellatus Günt., 1880.	152 C.	Admiralty Islands.
Engyophrys J. B.		
* *E. Sancti-Laurenti* J. B., 1889.	56–127 A.	Gulf of Panama.
Platophrys Swains.		
P. cornutus Günt., 1880.	32–350 C.	Off Brazil.
Scianectes Alc.		
S. macrophthalmus Alc., 1889.	98–102 I.	Off Madras and off Arakan coasts.
Pleuronichthys Gir.		
P. decurrens J. G., 1880.	21–191 A.	Off Californian coasts.
Monolene Goode.		
M. sessilicauda Goode, 1880.	68–721 A.	Off east coasts United States.
M. atrimana G. B., 1896.	288–603 B.	Off Barbados.
* *M. maculipinna* Garm.	112–201 A.	Off Cape Mala; off Malpelo ; Gulf of Panama.
* *M. dubiosa* Garm.	141 A.	Off Acapulco.
Citharichthys Bleek.		
C. arctifrons Goode, 1880.	–373 A.	Off east coasts United States.
C. unicornis Goode, 1880.	45–155 A.	" " " " "
C. dinoceros G. B., 1886.	110–955 B.	West Indies.
C. sordidus Gir., 1854.	–167 A.	Coasts of California.
* *C. maculifer* Garm.	66 A.	Cocos Islands.
Limanda Gottsche.		
L. Beanii Goode, 1880.	111–896 A.	Off east coasts United States.
Glyptocephalus Gottsche.		
G. cynoglossus Linn., 1758.	69–858 A.	Off east coasts United States; off Scandinavia.
G. zachirus Lock., 1879.	33–252 A.	Northeastern Pacific.
Nematops Günt.		
N. microstoma Günt., 1880.	152 C.	Admiralty Islands.
Pelecanichthys G. C.		
P. crumenalis G. C., 1896.	295–298 A.	Off Hawaiian Islands.
Boöpsetta Alc.		
B. umbrarum Alc., 1896.	180–217 I.	Off Colombo.
Embassichthys J. E.		
E. bathybius Gilb., 1890.	603 A.	Santa Barbara Channel.
Solea.		
S. solea Linn., 1758.	–129 T.	European to North African coasts.
S. variegata Don., 1807.	–167 T.	Off coasts of Spain to those of the Soudan.
S. profundicola Vaill., 1887.	136–684 T.	Coast of Portugal to Soudan.
S. (*Achirus*) *umbratilis* Alc., 1894.	91–107 I.	Off Coromandel coasts.
S. kaiana Günt., 1880.	140 C.	Ki Islands.
S. pacifica Lock., 1879.	35–350 A.	Northeastern Pacific.
Symphurus Raf.		
S. nigrescens Raf., 1810.	32–229 T.	Coasts of Spain to those of Soudan.

	Range in Depth. Fathoms.	Principal Localities.
S. nebulosus G. B., 1883.	229 B.	Off eastern coasts United States.
S. piger G. B., 1886.	26–250 B.	West Indies to Florida.
S. marginatus G. B, 1883.	94–324 B.	West Indies ; Gulf of Mexico ; E. coasts U. S.
S. pusillus G. B., 1885.	80–170 B.	Off east coasts United States.
S. Wood-Masoni Alc., 1889.	475–490 I.	Bay of Bengal ; Andaman Sea.
S. Gilesii Alc., 1889.	193–210 I.	Bay of Bengal ; off Madras coasts.
S. septemstriatus Alc., 1891.	142–400 I.	Off Colombo ; Andaman Sea.
S. trifasciatus Alc., 1894.	145–250 I.	Bay of Bengal.
* *S. varius* Garm.	52–112 A.	Cocos Islands; off Malpelo Island.
* *S. atramentatus* J. B., 1889.	112–210 A.	Off Cape Mala ; off Malpelo ; Gulf of Panama.
* *S. microlepis* Garm.	286 A.	Gulf of Panama.
CYNOGLOSSUS Buch.		
C. Carpenteri Alc., 1889.	68–107 I.	Off Coromandel coast.
PHYSOSTOMI.		
Sternoptychoidei.		
STERNOPTYX Herm.		
S. diaphana Herm., 1781.	150–2500.	North Atlantic, both sides.
S. diaphana Günt., 1887 (part)	500–2150 C.	N. W. Pacific ; off Malabar ; S. W. Pacific.
* *S. obscura* Garm.	134–1832 A.	Lat. 1° S. to 8° N., Lon. 78°–90° W.
ARGYROPELECUS Cocco.		
A. hemigymnus Cocco.	180–838 C., T.	Off coasts of Europe to the Canaries.
A. hemigymnus Alc., 1891.	1803 I.	Bay of Bengal.
A. affinis Garm.	683 A.	Northwestern Atlantic.
A. Olfersii Cuv., 1829.	519–1125 A., C.	Off east coasts U. S. ; off coasts of Portugal ; Cape Finisterre.
* *A. lychnus* Garm.	144–2069 A.	Lat. 1° S. to 8° N., Lon. 78° to 97° W.
POLYIPNUS Günt.		
P. spinosus Günt., 1887.	188–240 I.	Off the Philippines and Borneo; off Andaman coasts.
P. laternatus Garm.	221 B.	Off Barbados.
VALENCIENNELLUS J. E.		
V. ephippiatus G. C., 1896.	295 A.	Off Hawaiian Islands.
* *V. stellatus* Garm.	300 A.	Off coasts of California.
MAUROLICUS Cocco.		
* *M. oculatus* Garm.	–300 A.	Off coasts of California.
* *M. lucetius* Garm.	100–1832 A.	East of the Galapagos; Cocos Islands; off Las Tres Marias.
ICHTHYOCOCCUS Bon.		
I. ovatus Cocco, 1838.	519–1110 T.	Portugal to coasts of Morocco.
GONOSTOMA Raf.		
G. denudatum Raf., 1810.	251–645 T.	North Atlantic ; coasts of Morocco to Cape Verde Islands.
G. brevidens K. S., 1870.	161–500.	West Indies.
LYCHNOPOLES Garm.		
* *L. argenteolus* Garm.	210–286 A.	Gulf of Panama.
YARRELLA G. B.		
Y. Blackfordi G. B., 1896.	324 A.	Gulf of Mexico.
PHOTICHTHYS Hutt.		
P. argenteus Hutt., 1872.		Cook's Straits.
BONAPARTIA G. B.		
B. pedaliota G. B., 1896.	217 A.	Off west coast of Cuba.
CYCLOTHONE G. B.		
C. microdon Günt., 1878.	295–2675 C.	North Atlantic ; southwestern Atlantic.

	Range in Depth. Fathoms.	Principal Localities.
C. microdon Günt., 1878 (part.)	265–2900 C.	Northwestern Pacific; north Indian Ocean; southwestern Pacific.
C. bathyphila Vaill., 1888.	776–1249 T.	Azores and Gulf of Gascony; off E. coasts U. S.
* *C. acclinidens* Garm.	122–2413 A.	Lat. 1° S. to 37° N., Lon. 78°–139° W.
* *C. signata* Garm.	1793 A.	Gulf of Panama.
C. gracilis Günt., 1878.	245–2425 C.	South of Japan.
C. elongata Günt., 1878.	360–1200 C., I.	South of New Guinea; Laccadive Sea; off Banda Islands.
C. elongata G. B., 1896.	435–2369 F., A.	Off E. coasts United States to West Indies.
DIPLOPHOS Günt.		
D. corytheolum Alc., 1898.	185–405 I.	Andaman Sea.
OPISTHOPROCTUS Vaill.		
O. soleatus Vaill., 1888.	1110	Coasts of Morocco.
Myctophoidei.		
SYNODUS Gron.		
S. kaianus Günt., 1880.	140 C.	Ki Islands.
* *S. acutus* Garm.	56–127 A.	Southeast of Cape Mala.
BATHYLACO G. B.		
B. nigricans G. B., 1896.	2393 B.	Between Santa Cruz and St. Thomas, W. I.
BATHYSAURUS Günt.		
B. ferox Günt., 1878.	1100 C.	East coasts New Zealand.
B. mollis Günt., 1878.	1875–2385 C.	Off Yedo, Japan; mid southern Pacific.
B. Agassizii G. B., 1883.	647–1202 B., T.	Off E. coasts U. S.; off coasts of Morocco.
B. obtusirostris Vaill., 1888.	1998 T.	Off the Cape Verde Islands.
HARPODON Les.		
H. squamosus Alc., 1891.	200–300 I.	Bay of Bengal; off E. coast India.
SCOPELARCHUS Alc.		
S. Güntheri Alc., 1896.	947 I.	Off the Indus delta.
CHLOROPHTHALMUS Bon.		
C. Agassizii Bon., 1841.	159–787 A., T.	Off east coasts United States; off the Azores.
C. productus Günt., 1887.	315 C.	Off the Fiji Islands.
C. nigripinnis Günt., 1878.	120 C.	Off Twofold Bay.
C. gracilis Günt., 1878.	1100–1425 C.	Off New Zealand; mid to southwestern Atlantic.
C. chalybeius Goode, 1881.	85–157 F., B.	Off east coasts United States.
C. corniger Alc., 1894.	145–250 I.	Bay of Bengal.
C. truculentus G. B., 1896.	158 B.	Off Barbados.
C. proridens G. C., 1896.	298–351 A.	Hawaiian Islands.
* *C. mento* Garm.	210–286 A.	Gulf of Panama.
SCOPELENGYS Alc.		
S. tristis Alc., 1890.	1000 I.	Laccadive Sea.
* *S. lugubris* Garm.	695–1832 A.	Off Mariato Point; Gulf of Panama.
BENTHOSAURUS G. B.		
B. grallator G. B., 1886.	1537–1850 B.	West Indies.
BATHYPTEROÏS Günt.		
B. longifilis Günt., 1878.	520–630 C.	Near the Kermadec Islands.
B. longipes Günt., 1878.	520–2650 C.	Off E. coast U. S.; off E. coast S. America.
B. longicauda Günt., 1878.	2550 C.	Mid South Pacific.
B. quadrifilis Günt., 1878.	500–770.	Off coast Brazil; off E. coast U. S. to Dominica.
B. Güntheri Alc., 1889.	490–561 I.	Off coasts Andamans.
B. insularum Alc., 1892.	1140 I.	Laccadive Sea.
B. atricolor Alc., 1896.	459–891 I.	Off the Maldives; Cape Comorin; Laccadive Sea.
B. dubius Vaill., 1888.	456–894 T.	Coasts of Morocco.
* *B. ventralis* Garm.	660–880 A.	Off Acapulco; Las Tres Marias.
* *B. pectoralis* Garm.	885–1132 A.	South of Malpelo; Gulf of Panama.

	Range in Depth. Fathoms.	Principal Localities.
Ipnops Günt.		
I. Murrayi Günt., 1878.	1507–1900 C.	Off coast Brazil ; to mid South Atlantic ; West Indies.
I. Murrayi Günt., 1878 (part).	2150 C.	North of Celebes.
* *I. Agassizii* Garm.	1360 A.	Between Acapulco and Culpepper Islands.
Myctophum Raf.		
M. Mülleri Gmel., 1788.	–2369 A.	Off E. coasts U. S. ; northeastern Atlantic.
M. punctatum Raf., 1810.	224–571 F.	Off east coasts United States.
M. Humboldti Risso, 1810.	–1641 A.	“ “ “ “ “
M. Cocco Cocco, 1829.	–2620 A.	Off E. coasts U. S. ; Mediterranean Sea.
M. gemellarium Cocco, 1838.	300–894 T.	Coasts of Morocco to those of Soudan.
M. Dumérilii Bleek., 1856.	315 C.	Fiji Islands.
M. macrolepidotum Johns., 1863.	738–869 T.	Coasts of Morocco.
M. maderense Lowe, 1839.	–1686 A.	Madeira ; off east coasts United States.
M. macrolepidotum Günt., 1887.	188–630 I., C.	Kermadec Islands; Andaman Sea.
M. arcticum Lütk., 1891.	582–745 Ing.	Southwest of Iceland ; west of Greenland.
M. glaciale Rein., 1838.	485–1040 Ing.	Off east, south and western coasts of Iceland and Greenland.
M. elongatum Costa.	845–1040 Ing.	South and west of Iceland.
M. caudispinosum Johns., 1863.	1782 A.	Off east coasts United States.
M. engraule Günt., 1887.	188–250 I., C.	Philippines ; Andaman Sea.
M. nigrum Günt., 1887.	500 C.	South of the Philippines.
M. pyrsobolum Alc., 1890.	690–920 I.	Off coasts of Madras.
M. pterotum Alc., 1890.	98–102 I.	Off Madras coasts.
M. antarcticum Günt., 1878.	1950–1975 C.	Antarctic.
M. mannochir Gilb., 1890.	266–685 A.	Off northwest coasts United States.
M. mexicanum Gilb., 1890.	306–857 A.	Off Lower California.
M. regale Gilb., 1891.	822 A.	Off coasts of California.
M. Macdonaldi G. B., 1896.	515–1209 A.	Gulf Stream.
M. protocule Gilb., 1890.	584 A.	Off coasts of Washington.
M. alatum G. B., 1896.	525 A.	Gulf Stream.
M. gemmifer G. B., 1896.	538 A.	Grand Banks, off east coasts United States.
M. lacertum G. B., 1896.	–200 A.	Gulf Stream, off east coasts United States.
M. quercinum G. B., 1896.	–1686 A.	“ “ “ “ “ “
M. castaneum G. B., 1896.	–192 A.	“ “ “ “ “ “
M. speculiger G. B., 1896.	551 A.	“ “ “ “ “ “
M. lucidum G. B., 1896.	1639 A.	Off Leeward Islands.
M. effulgens G. B., 1896.	1639 A.	Off Leeward Islands ; off E. coast U. S.
M. opalinum G. B., 1896.	–1536 A.	Gulf Stream, off east coasts United States.
* *M. oculeum* Garm.	–1772 A.	Off Mariato Point.
* *M. tenuiculum* Garm.	–100 A.	South of Mariato Point.
* *M. luminosum* Garm.	421 A.	Galapagos Islands.
* *M. aurolaternatum* Garm.	918–1793 A.	North of Malpelo Island ; North of Culpepper Island.
* *M. laternatum* Garm.	–1168 A.	West of Guatemala ; Gulf of Panama ; Gulf of California.
* *M. nitidulum* Garm.	–100 A.	Lat. 27° 50′ N., Lon. 145° 45′ 30″ W.
* *M. atratum* Garm.	1216 A.	Gulf of California.
M. urolampus G. C., 1896.	295–310 A.	Hawaiian Islands.
M. fibulatum G. C., 1896.	310 A.	“ “
M. macrolepidotum G. C., 1896.	343–375	“ “
Omosudis Günt.		
O. Lowii Günt., 1887.	500 C.	South of the Philippines.
O. Lowii G. B., 1896.	724 A.	Lat. 28° 47′ 30″ N., Lon. 87° 27′ W.

	Range in Depth. Fathoms.	Principal Localities.
Odontostomus Cocco.		
O. hyalinus Cocco, 1838.		Mediterranean.
O. atratus Alc., 1893.	573 I.	Bay of Bengal.
Paralepis Risso.		
P. coregonoides Risso, 1826.	525 A.	Med. Sea; Lat. 28° 47′ 30″ N., Lon. 87° 27′ W.
P. borealis Rein.	407–488 A.	Off New England.
Plagyodus Stell.		
P. ferox Lowe, 1833.	195–275 A.	Off coasts New England.
Stomiatoidei.		
Chauliodus Bl. S.		
C. Sloani B. S., 1801.	435–2575 A., C.	Northern Atlantic, both sides; off coasts of Morocco.
C. Sloani Günt., 1887 (part)	565–2000 C.	Japan; south of New Guinea; Bay of Bengal; Laccadive Sea.
C. pammelas Alc., 1892.	1370 I.	Laccadive Sea.
C. Maccouni Bean., 1892.	876 A.	Off Queen Charlotte's Island; off Southern California.
* *C. barbatus* Garm.	465–1201 A.	Off Mariato Point; off Malpelo Island.
C. dentatus Garm.		Society Islands.
Astronesthes Rich., 1845.		
A. niger Rich., 1845.	2500 C.	Near Sierra Leone, Africa.
A. gemmifer G. B., 1896.	300	Off Newfoundland.
Stomias Cuv.		
S. boa Risso, 1810.	221–984 T.	Cape Verde Islands; Gulf of Gascony.
S. ferox Rein., 1842.	120–1813 A.	Off coasts New England; south of Greenland.
S. affinis Günt., 1887.	450 C.	South of Sombrero Island.
S. polylepis (= *S. boa* Günt., 1887).	1800 C.	South of Australia.
S. nebulosus Alc., 1889.	597 I.	Gulf of Manaar.
S. elongatus Alc., 1891.	738 I.	Laccadive Sea.
* *S. colubrinus* Garm.	1672 A.	Off Mariato Point.
* *S. hexagonatus* Garm.	286–2232 A.	Off Guatemala and the Cocos Islands; Gulf of Panama.
* *S. atriventer* Garm.	1218 A.	Gulf of California.
Echiostoma Lowe.		
E. barbatum Lowe, 1843.	500–959 A.	Madeira; off New England.
E. margarita G. B., 1896.	420 A.	Gulf of Mexico.
Opostomias Günt.		
O. micripnus Günt., 1878.	2150 C.	South of Australia.
Pachystomias Günt.		
P. microdon Günt., 1878.	2440 C.	Northwest of Australia.
Photonectes Günt.		
P. albipinnis Död., 1882.		Off Inosima, Japan.
P. gracilis G. B., 1896.	472 B.	Off Martinique.
Eustomias Vaill.		
E. obscurus Vaill., 1888.	1526 T.	Off the Azores.
Thaumastomias Alc.		
T. atrox Alc., 1890.	1310 I.	Off Madras coasts.
Photostomias Coll.		
P. Guernei Coll., 1889.	572 H.	Off the Azores.
Grammatostomias G. B.		
G. dentatus G. B., 1896.	2069 A.	Off east coasts United States.
Dactylostomias Garm.		
* *D. filifer* Garm.	660–2232 A.	Off Culpepper Island; off Guatemala; off [Acapulco.

	Range in Depth. Fathoms.	Principal Localities.
Malacosteus Ayr.		
M. niger Ayr., 1849.	541–1064 A.	Off east coast United States to Barbados.
M. indicus Günt., 1878.	500–650 C., I.	Off the Philippines; Andaman Sea.
M. choristodactylus Vaill., 1888.	765–1213 T.	Off Morocco and the Azores.
Bathophilus Gigl.		
B. nigerrimus Gigl., 1884.		Mediterranean Sea.
Idiacanthus Pet.		
I. fasciola Pet., 1876.		South Indian Ocean.
I. ferox Günt., 1878.	2750 C.	Mid North Atlantic.
* *I. antrostomus* Gilb., 1890.	603–1832 A.	Off Southern California; off Malpelo Island; Gulf of Panama.
Salmoidei.		
Argentina Art.		
A. silus Asc., 1775.	–200	Off northern Europe; off E. coast New England
A. sphyraena Linn., 1758.	–200	North Atlantic to Mediterranean.
A. striata G. B., 1896.	111 A.	Off eastern United States.
Leuroglossus Gilb.		
L. stilbius Gilb., 1890.	40–221 A.	Off coasts of California.
Bathylagus Günt.		
B. atlanticus Günt., 1878.	2040 C.	South Atlantic.
B. antarcticus Günt., 1878.	1950 C.	Antarctic.
B. pacificus Gilb., 1890.	685–877 A.	Off northwest coast United States.
B. borealis Gilb., 1896.	322 A.	North of the Aleutian Islands.
B. Benedicti G. B., 1896.	1022–1769 A.	Off eastern coasts United States.
B. euryops G. B., 1896.	600–1356 A.	“ “ “ “ “
B. Milleri J. E., 1898.	776 A.	Cortez Banks, off San Diego, California.
Pterothrissus Hilg.		
P. gissu Hilg., 1877.	“ ?345 ” C.	Off Inosima, Japan.
Alepocephaloidei.		
Leptochilichthys Garm.		
* *L. Agassizii* Garm.	1573 A.	Off Galera Point.
Bathytroctes Günt.		
B. microlepis Günt., 1878.	1090 C.	Southeast of Cape St. Vincent.
B. rostratus Günt., 1878.	675 C.	Off Pernambuco.
B. macrolepis Günt., 1887.	2150 C.	North of Celebes.
B. homopterus Vaill., 1888.	608 T.	Bank of Arguin.
B. melanocephalus Vaill., 1888.	784–1421	Off coasts of Morocco and the Soudan.
B. attritus Vaill., 1888.	788–1998 T.	Bank of Arguin; Cape Verdes; Azores.
B. microlepis Alc., 1889.	500 I.	Andaman Sea.
B. squamosus Alc., 1890.	740 I.	Off the Goa coast.
B. stomias Gilb., 1890.	877 A.	Off coasts Oregon.
B. antillarum G. B., 1896.	420 A.	Caribbean Sea.
B. æquatoris G. B., 1896.	741 A.	Lat. 1° N., Lon. 80° W.
B. megalops Lütk., 1898.	1040 Ing.	West of Iceland.
* *B. inspector* Garm.	1471 A.	East of the Cocos Islands.
* *B. alvifrons* Garm.	1360–1793 A.	S. of Cape Mala; N. of Culpepper Island.
* *B. alveatus* Garm.	1132–1322 A.	S. of Malpelo Island; E. of Chatham Island.
Narcetes Alc.		
N. erimelas Alc., 1890.	740 I.	Off the Goa coasts.
* *N. pluriserialis* Garm.	1010 A.	Off the Cocos Islands.
Alepocephalus Risso.		
A. rostratus Risso, 1810.	453–1998 T.	Mediterranean to Canaries and to Azores.
A. niger Günt., 1878.	1400 C.	North of Australia.

	Range in Depth. Fathoms.	Principal Localities.
A. Agassizii G. B., 1883.	538–1106 B.	Lat. 38° N., Lon. 78° W.; Lat. 62° 25′ N., Lon. 28° 30′ W.
A. Bairdii G. B., 1880.	200	Off Newfoundland.
A. productus Gill, 1884.	1362 A.	Lat. 39° N., Lon. 70° W.
A. tenebrosus Gilb., 1891.	359–822 A.	Santa Barbara Channel.
A. bicolor Alc., 1891.	240–276 A.	Off Madras coasts.
A. Blanfordi Alc., 1892.	902 I.	Gulf of Manaar.
A. edentulus Alc., 1892.	475 I.	Off Madras coasts.
A. Giardi Koeh., 1896.	437–771	Bay of Biscay.
* *A. convexifrons* Garm.	660 A.	Off Acapulco.
* *A. asperifrons* Garm.	782–1020 A.	Gulf of Panama.
* *A. fundulus* Garm.	1270–1672 A.	Between Cocos Islands and Mariato Point; [Gulf of Panama.
AULASTOMATOMORPHA Alc.		
A. phosphorops Alc., 1890.	1000 I.	Laccadive Sea.
CONOCARA G. B.		
C. Macdonaldi G. B., 1896.	724–955 A., B.	Gulf of Mexico.
C. macroptera Vaill., 1888.	462–1156 T.	Canaries to coasts of Morocco; off St. Kitts, [W. I.
PLATYTROCTES Günt.		
P. apus Günt., 1878.	1500 C.	Mid Atlantic.
P. apus Alc., 1890.	740 I.	Off the Goa coasts.
XENODERMICHTHYS Günt.		
X. nodulosus Günt., 1878.	345 C.	South of Yedo, Japan.
X. Güntheri Alc., 1892.	678 I.	Off Madras coasts.
X. socialis Vaill., 1888.	392–738 T.	Off coasts of Soudan and Morocco.
X. squamilaterus Alc., 1898.	370–419 I.	Off the Andamans.
X. Copei Gill, 1884.	2949 A.	Gulf Stream, Lat. 37° N., Lon. 69° W.
LEPTODERMA Vaill.		
L. macrops Vaill., 1888.	573–1274 T.	Coasts of Morocco and Soudan; Bank of Arguin.
L. macrops Alc., 1892.	753 I.	Off Madras coasts.
RONDELETIA G. B.		
R. bicolor G. B., 1894.	961–1641 A.	Off eastern coasts United States.
CETOMIMUS G. B.		
C. Storeri G. B., 1894.	1535 A.	Off eastern coasts United States.
C. Gillii G. B., 1894.	1043 A.	" " " " "
ANOMALOPTERUS Vaill., 1888.		
A. pinguis Vaill., 1888.	765 T.	Off Morocco.
Halosauroidei.		
HALOSAURUS Johns.		
H. Owenii Johns., 1863.	128–693 B., A.	Madeira; coasts of Soudan and Morocco; off [Eastern United States.
* *H. radiatus* Garm.	259–511 A.	Gulf of Panama.
H. Güntheri G. B., 1896.	456–1156 A.	Gulf Stream, Lat. 39° N., Lon. 72° W.
H. parvipennis Alc., 1892.	865–880 I.	Laccadive Sea.
H. carinicauda Alc., 1889.	490 I.	Andaman Sea.
H. nigerrimus Alc., 1898.	459 I.	Off the Maldives.
* *H. attenuatus* Garm.	1360 A.	North of Culpepper Island.
H. anguilliformis Alc., 1889.	675 I.	Andaman Sea.
H. Johnsonianus Vaill., 1888.	456–1156 T.	Coasts of Morocco and the Soudan to the [Canaries.
H. gracilis G. B., 1896.	769–1430 B., A.	Lat. 28° N., Lon. 87° W.
H. affinis Günt., 1877.	565–1000 C., I.	Sea of Japan; Laccadive Sea.
H. pallida G. B., 1896.	679–1430 A.	Gulf of Mexico.
H. Goodei Gill, 1883.	1098–1731 A.	Gulf Stream, off South Carolina.
H. Hoskynii Alc., 1890.	1000 I.	Laccadive Sea.
H. mediorostris Günt., 1877.	700–719 C., I.	W. of the Philippines; off N. Maldive Atoll.

	Range in Depth. Fathoms.	Principal Localities.
H. phalacrus Vaill., 1888.	603–1213 T.	Coasts of Morocco and the Soudan to the Azores.
H. rostratus Günt., 1878.	2750 C.	Mid Atlantic.
H. macrochir Günt., 1878.	647–1637	South Indian Ocean; off Azores to Med. Sea; Lat. 33°–42° N., Lon. 69°–77° W.
Notacanthoidei.		
Polyacanthonotus Bleek.		
P. Rissoanus F. V., 1859.		
P. Challengeri Vaill., 1888.	1625–1875 A., C.	South of Yedo; Bering Sea.
P. rostratus Coll., 1889.	362–963 Ing., A.	Newfoundland Banks; off east coasts U. S.
P. altus G. T., 1897.	1401 A.	Bering Sea.
P. longus G. T., 1897.	900 A.	" "
Notacanthus Bloch.		
N. Chemnitzii Bl., 1787.		South of Greenland and Iceland.
* *N. spinosus* Garm.	322–458 A.	Gulf of Panama.
N. phasganorus Goode, 1881.		Banks of Newfoundland.
N. analis Gill, 1883.	407–478 A.	Lat. 32° 39′ N., Lon. 70° 77° W.
N. Bonapartii Risso, 1840.		Mediterranean Sea.
N. Moseleyi G. B., 1894.	400 C.	Southwestern coast of South America.
N. sexspinis Rich., 1848.		South of Australia and New Zealand.
Lipogenys G. B.		
L. Gillii G. B., 1894.	865 A.	Gulf Stream, Lat. 37° 46′ 30′ N.; Lon. 73° 56′ [30″ W.
Murænoidei.		
Uroconger Kaup.		
U. vicinus Vaill., 1888.	346–816 T.	Cape Verdes; coasts of Soudan; Bank of [Arguin.
U. vicinus Alc., 1892.	475–636 I.	Off Madras coasts; Laccadive Sea.
* *U. varidens* Garm.	259–555 A.	Off Mariato Point; off Cape San Francisco.
U. vicinalis (= *U. vicinus* G. B., 1896, Oc. Ich., fig. 160.)	146 A.	Lat. 23° 10′ 36″ N., Lon. 82° 20′ 28″ W.
Coloconger Alc.		
C. raniceps Alc., 1889.	200–400 I.	Andaman Sea; Bay of Bengal.
Congermuræna Kaup.		
C. guttulata Günt., 1887.	315 C.	Off Matuka, Fiji Islands.
C. macrocercus Alc., 1889.	200–300 I.	Andaman Sea; Bay of Bengal.
C. macrura Gilb., 1891.	145 A.	Gulf of California.
* *C. prorigera* Gilb., 1891.	295-401 A.	Between the Galapagos and Cape San Francisco, Ecuador; Gulf of Panama.
C. squaliceps Alc., 1893.	128–210 I.	Off Madras coasts.
C. nasica Alc., 1893.	128–210 I.	Off Madras coasts.
C. musteliceps Alc., 1894.	165–250 I.	" " "
* *C. caudalis* Garm.		Off Cape Mala.
Congrosoma Garm.		
* *C. Evermanni* Garm.	182 A.	Off Cape Mala.
Dysomma Alc.		
D. bucephalus Alc., 1889.	128–276 I.	Bay of Bengal off the E. coast of the Peninsula.
Dysommopsis.		
D. muciparus Alc., 1891.	240–270 I.	Off Madras coasts.
Promyllantor Alc.		
P. purpureus Alc., 1890.	1000 I.	Laccadive Sea.
Simenchelys Gill.		
S. parasiticus G. B., 1879.	200–1093 A., H.	Off New England; between Portugal and the [Azores.
Histiobranchus Gill.		
H. bathybius Günt., 1877.	1375–2050 C.	Antarctic Ocean; mid North Pacific; South of Japan; Bering Sea.

	Range in Depth. Fathoms.	Principal Localities.
H. infernalis Gill, 1883.	1435–1731 Ing., A.	Lat. 36° 30′ 30″ N., Lon. 69° 8′ 25″ W.; Davis Straits.
Synaphobranchus Johns.		
S. pinnatus Gron , 1854.	129–1749 B., T.	Off east coasts United States; off Morocco and the Soudan to Cape Verdes and Azores.
S. affinis Günt., 1877.	345 C.	Off Inosima, Japan.
S. brevidorsalis Günt., 1887.	345–1070 C.	North of New Guinea and off Inosima.
Ilyophis Gilb.		
I. brunneus Gilb., 1891.	634 A.	Off Chatham Island.
Derichthys Gill.		
D. serpentinus Gill, 1887.	1022 A.	Off east coasts United States.
Ophichthys Ahl.		
O. cruentifer G. B., 1896.	120–245	Off E. coasts United States, Lat. 39° 57′ N., Lon. 69° 28′ W.
Cryptopterus Kaup.		
* *C. frontalis* Garm.	153–242 A.	Gulf of Panama.
Myrus Kaup.		
M. pachyrhynchus Vaill., 1888.	574–784 T.	Off Morocco.
Sauromuræenesox Alc.		
S. vorax Alc., 1889.	193–250 I.	Bay of Bengal.
Hoplunnis Kaup.		
H. diomedianus G. B., 1896.	111 A.	Lat. 28° 36′ N., Lon. 86° 50′ W.
Xenomystax Gilb.		
X. atrarius Gilb., 1891.	401 A.	Off west coast of Ecuador.
X. trucidans Alc., 1894.	719–406 I.	Off north Maldive Atoll; off Travancore.
* *X. rictus* Garm.	322–511 A.	Gulf of Panama; Galapagos Islands; off [Acapulco.
Nettenchelys Alc.		
N. Taylori Alc., 1898.	430 I.	Off Travancore coast.
Nettastoma Raf.		
N. melanurum Raf., 1810.	49–415 T.	Mediterranean; Gulf of Genoa; coasts of Soudan to Cape Verde Islands.
N. parviceps Günt., 1877.	345 C.	South of Yedo, Japan.
N. tæniola Alc., 1889.	240–280 I.	Andaman Sea; Bay of Bengal.
Chlopsis Raf.		
C. equatorialis Gilb., 1891.	401 A.	Lat. 0° 37′ S., Lon. 81° W.
* *C. Gilbertii* Garm.	511 A.	Lat. 7° 21′ N., Lon. 79° 35′ W.
Venefica J. D.		
V. procera G. B., 1883.	178–647 A.	Lat. 33° to 34° N., Lon. 76° W.
V. proboscidea Vaill., 1888.	1202 T.	Off Morocco.
* *V. tentaculata* Garm.	660–978 A.	Off Cocos Islands; off Acapulco.
* *V. ocella* Garm.	1067 A.	Lat. 5° 30′ N., Lon. 86° 45′ W.
Spinivomer G. R.		
S. Goodei G. R., 1883.	2361 A.	Lat. 38° 19′ 26″ N., Lon. 68° 20′ 20″ W.
Gavialiceps Alc.		
G. microps Alc., 1889.	902–1370 I.	Gulf of Manaar; Bay of Bengal; Laccadive Sea.
Serrivomer G. R.		
S. Beanii G. R., 1883.	855 A.	Gulf Stream, Lat. 41° 40′ 30″ N., Lon. 65° 28′ 30″ W.
S. Richardi Vaill., 1888.	1637 T.	Off the Azores.
* *S. sector* Garm.	134–1672 A.	Lat. 3° 9′ to 7° 5′ 30″ N., Lon. 79°–87° W.
Labichthys G. R.		
L. infans Günt., 1878.	500–2500 C.	Off Pernambuco; Mona Channel; mid Atlantic.
L. carinatus G. R., 1883.	906 A.	Gulf Stream, Lat. 41° N., Lon. 65° W.
L. elongatus G. R., 1883.	1628 A.	Gulf Stream, Lat. 39° 22′ N., Lon. 68° 34′ W.

	Range in Depth. Fathoms.	Principal Localities.
L. Gillii Bean, 1890.	1569 A.	East of P. of Wales Island.
* *L. Bowersii* Garm.	1471–2232 A.	Midway from Cocos Islands to Mariato Point.
Nemichthys Rich.		
N. scolopaceus Rich., 1848.	216–2369 F., A.	South Atlantic; Madeira; Bank of Arguin; off New England.
N. avocetta J. G.	A.	Puget Sound.
N. acanthonotus Alc., 1894.	475 I.	Bay of Bengal.
* *N. fronto* Garm.	458–1588 A.	Gulf of Panama; Gulf of California.
Cyema Günt.		
C. atrum Günt., 1878.	1500–1800 C.	South Pacific; Antarctic Ocean.
C. atrum Vaill., 1888.	1208 T.	Off Morocco.
Saccopharynx Mitch.		
S. ampullaceus Harw., 1827.	898 B.	Lat. 35° 44′ 40″ N., Lon. 74° 40′ 20″ W.
Eurypharynx Vaill.		
E. pelecanoides Vaill., 1888.	574–1257 T.	Off coasts of Morocco.
Gastrostomus G. R.		
G. Bairdii G. R., 1883.	389–1632 A., B.	Off eastern coasts U. S.; Lat. 34°–42° N., Lon. [65°–76° W.
MYXINIA.		
SYMPHYTOBRANCHII.		
Myxinoidei.		
Geotria Gray.		
G. chilensis Gray, 1851.		Off coasts of Chili.
G. australis Gray, 1851.		Off southern coasts of Australia.
Mordacia Gray.		
M. mordax Rich., 1848.		Off the coasts of New Zealand.
M. lapicida Gray, 1851.		Off the coast of Chili.
Petromyzon Art.		
P. marinus Linn., 1758.	–247	Off coasts Europe and of eastern United States.
P. macrostomus Burm., 1868.		Off the southeastern coast of South America.
P. tridentatus Rich., 1836.		Off northwestern coasts of North America.
P. (*Bathymyzon*) *Bairdii* Gill, 1883.	547 A.	Lat. 40° 2′ N., Lon. 68° 50′ 30″ W.
Homea Flem.		
H. cirrhata Bl. S., 1801.		Off Australia; off New Zealand; South Seas.
H. polytrema Gir., 1854.		Off coasts of Chili.
H. Stouti Lock., 1878.		Off coasts of California.
Myxine Linn.		
M. glutinosa Linn., 1758.	251 Tr.	Coasts of British Isles and northern Europe to Mediterranean Sea; coasts of Portugal.
M. acutifrons Garm.		Straits of Magellan.
M. limosa Gir., 1858.	524 B.	Off New York to Greenland; Lat. 41° 32′ N., Lon. 65° 55′ W.
M. australis Jen., 1842.		Tierra del Fuego; Straits of Magellan.
M. tridentiger Garm.		Southern coasts of South America.
M. cirrhata Schl.	345 C.	Seas of Japan.
* *M. circifrons* Garm.	730 A.	Gulf of Panama.

LIST OF STATIONS AND OF SPECIES COLLECTED AT EACH STATION.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3353	7° 6′ 15″ N.	80° 34′ W.	695 fathoms	39° F.	Gn. M.

Dibranchichthys nudivomer, Bothrocaropsis rictolata, Bothrocaropsis elongata, Lycodes incisus, Antimora rhina, Phyciculus longipes, Macrurus carminifer, Macrurus convergens, Macrurus anguliceps, Argyropelecus lychnus, Scopelengys dispar, Stomias hexagonatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3354	7° 9′ 45″ N.	80° 50′ W.	322 fathoms	46° F.	Gn. M.

Trichiurus nitens, Malthopsis sparsa, Macrurus leucophæus, Macrurus carminifer, Macrurus latirostratus, Halosaurus radiatus, Notacanthus spinosus, Congermuræna caudalis, Xenomystax rictus, Atopichthys cingulus, Atopichthys lychnus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3355	7° 12′ 20″ N.	80° 55′ W.	182 fathoms	54.1° F.	Bk. G. Sh.

Pontinus furcirhinus, Zalieutes elater, Peristedium crustosum, Læmonema gracillipes, Phyciculus longipes, Phyciculus rastrelliger, Macrurus canus, Monolene maculipinna, Symphurus atramentatus, Congrosoma Evermanni.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3356	7° 9′ 30″ N.	81° 8′ 30″ W.	546 fathoms	40.1° F.	Sft. bl. M.

Centroscyllium nigrum, Melamphaës mizolepis, Macrurus boöps, Sternoptyx obscura, Argyropelecus lychnus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3357	6° 35′ N.	81° 44′ W.	782 fathoms	38.5° F.	Gn. S.

Raia badia, Macrurus convergens, Sternoptyx obscura, Alepocephalus asperifrons, Uroconger varidens, Atopichthys sicarius.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3358	6° 30′ N.	81° 44′ W.	555 fathoms	40.2° F.	Gn. S.

Centroscyllium nigrum, Melamphaës mizolepis, Malthopsis erinacea, Dicrolene filamentosa, Dicrolene nigra, Monomitopus torvus, Lamprogrammus illustris, Macrurus trichiurus, Cyclothone acclinidens, Myctophum oculeum, Stomias hexagonatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3359	6° 22′ 20″ N.	81° 52′ W.	465 fathoms	42° F.	Rocky.

Raia badia, Chauliodus barbatus.

Station	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3360	6° 17′ N.	82° 5′ W.	1672 fathoms	36.4 F.	Fne. bk. dk. gn. S.

Lycodes cicatrifer, Bassozetus nasus, Macrurus fragilis, Sternoptyx obscura, Argyropelecus lychnus, Scopelengys dispar, Stomias colubrinus, Alepocephalus fundulus, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature	Bottom.
3361	6° 10′ N.	83° 6′ W.	1471 fathoms	36° 6′ F.	Gn. Oz.

Maynea bulbiceps, Cataetyx simus, Stomias hexagonatus, Bathytroctes inspector, Serrivomer sector, Labichthys Bowersii.

Station.	Latitude	Longitude.	Depth.	Temperature.	Bottom.
3362	5° 56′ N.	85° 10′ 30″ W.	1175 fathoms	36.8° F.	Gn. M. S. rky.

Dibranchus hystrix, Mixonus caudalis, Macrurus anguliceps, Cyclothone acclinidens, Stomias hexagonatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3363	5° 43′ N.	85° 50′ W.	978 fathoms	37.5° F.	Wh. glob. Oz.

Chaunax coloratus, Eretmichthys pinnatus, Macrurus bulbiceps, Cyclothone acclinidens, Venefica tentaculata.

Station.	Latitude.	Longitude.	Depth.	Temperature	Bottom.
3364	5° 30′ N.	86° 8′ 30″ W.	902 fathoms	38° F.	Yl. glob. Oz.

Dibranchus scaber, Paraliparis attenuatus, Cyclothone acclinidens, Venefica tentaculata.

Station.	Latitude.	Longitude.	Depth.	Temperature	Bottom.
3365	5° 31′ N.	86° 31′ W.	1010 fathoms	37° F.	Yl. glob. Oz.

Sciadonus pedicellaris, Narcetes pluriserialis.

Station.	Latitude	Longitude.	Depth.	Temperature.	Bottom.
3366	5° 30′ N.	86° 45′ W.	1067 fathoms	37° F	Yl. glob. Oz.

Mixonus caudalis, Porogadus atripectus, Eretmichthys pinnatus, Macrurus anguliceps, Myctophum oculeum, Venefica ocella, Atopichthys ophichthys.

Station.	Latitude	Longitude.	Depth.	Temperature.	Bottom.
3367	5° 31′ 30″ N.	86° 52′ 30″ W.	100 fathoms	57.1° F.	Rocky.

Serranus Bulleri, Pontinus furcirhinus, Peristedium crustosum, Symphurus varius, Maurolicus lucetius.

Station.	Latitude.	Longitude.	Depth	Temperature.	Bottom.
3368	5° 32′ 45″ N.	86° 54′ 30″ W.	66 fathoms	58.4° F.	Rocky.

Anthias multifasciatus, Pontinus furcirhinus, Oncocephalus porrectus, Hippoglossina vagrans, Citharichthys maculifer, Platophrys leopardinus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3370	5° 36′ 40″ N.	86° 56′ 50″ W.	134 fathoms	54.8° F.	Rocks and S.

Porogadus longiceps, Macrurus bucephalus, Sternoptyx obscura, Cyclothone acclinidens, Stomias hexagonatus, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3371	5° 26′ 20″ N.	86° 55′ W.	770 fathoms	39° F.	Glob. Oz.

Dolopichthys allector, Macrurus anguliceps, Venefica tentaculata, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3374	2° 35′ N.	83° 53′ W.	1823 fathoms	36.4 F.	Gn. Oz.

Careproctus longifilis, Holcomycteronus digittatus, Macrurus fragilis, Sternoptyx obscura.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3375	2° 34′ N.	82° 29′ W.	1201 fathoms	36.6° F.	Gy. glob. Oz.

Dibranchus hystrix, Holcomycteronus digittatus, Sternoptyx obscura, Argyropelecus lychnus, Cyclothone acclinidens, Chauliodus barbatus, Idiacanthus antrostomus, Atopichthys dentatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3376	3° 9′ N.	82° 8′ W.	1132 fathoms	36.3° F.	Gy. glob. Oz.

Mixonus caudalis, Macrurus anguliceps, Bathypteroïs pectoralis, Chauliodus barbatus, Bathytroctes alveatus, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3377	3° 56′ N.	81° 40′ 15″ W.	764 fathoms	38° F.	Mud.

Sternoptyx obscura, Cyclothone acclinidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3378	3° 58′ 20″ N.	81° 36′ W.	112 fathoms	55.9° F.	Brk. Sh.

Anthias multifasciatus, Pontinus furcirhinus, Callionymus atrilabiatus, Monolene maculipinna, Symphurus varius, Symphurus atramentatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3379	3° 59′ 40″ N.	81° 35′ W.	52 fathoms	00.0° F.	Rocks.

Symphurus varius.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3380	4° 3′ N.	81° 31′ W.	899 fathoms	37.2° F.	Rocks.

Lycodapus fierasfer, Dicrolene nigra.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3381	4° 56′ N.	80° 52′ 30″ W.	1772 fathoms	35.8° F.	Gn. M.

Paraliparis fimbriatus, Porogadus longiceps, Bassozetus nasus, Acanthonus spinifer, Sternoptyx obscura, Argyropelecus lychnus, Cyclothone acclinidens, Myctophum oculeum, Serrivomer sector, Atopichthys acus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3382	6° 21′ N.	80° 41′ W.	1793 fathoms	35.8° F.	Gn. M.

Melamphaës nigrofulvus, Paraliparis latifrons, Gymnelis conorhynchus, Porogadus longiceps, Argyropelecus lychnus, Cyclothone signata, Cyclothone acclinidens, Scopelengys dispar, Myctophum tenuiculum, Myctophum aurolaternatum, Bathytroctes alvifrons.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3383	7° 21′ N.	79° 2′ W.	1832 fathoms	36° F.	Gr. glob. Oz.

Caulolepis subulidens, Sternoptyx obscura, Argyropelecus lychnus, Cyclothone acclinidens, Scopelengys dispar, Stomias hexagonatus, Idiacanthus antrostomus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3384	7° 31′ 30″ N.	79° 14′ W.	458 fathoms	42° F.	Gn. S.

Trachichthys mento, Lycodopsis scaurus, Monomitopus torvus, Macrurus capito, Macrurus gracillicauda, Macrurus latirostratus, Macrurus tenuicauda, Argyropelecus lychnus, Notacanthus spinosus, Xenomystax rictus, Nemichthys fronto.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3385	7° 32′ 36″ N.	79° 16′ W.	286 fathoms	45.9° F.	Gn. M.

Malthopsis sparsa, Lepophidium emmelas, Merluccius angustimanus, Læmonema gracillipes, Phyciculus longipes, Phyciculus rastrelliger, Macrurus gracillicauda, Macrurus orbitalis, Symphurus microlepis, Argyropelecus lychnus, Lychnopoles argenteolus, Chlorophthalmus mento, Stomias hexagonatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3386	7° 33′ 12″ N.	79° 17′ 15″ W.	242 fathoms	48° F.	Fne. gy. S.

Malthopsis sparsa, Lepophidium emmelas, Phyciculus rastrelliger, Lychnopoles argenteolus, Chlorophthalmus mento, Cryptopterus frontalis, Atopichthys obtusus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3387	7° 40′ N.	79° 17′ 50″ W.	127 fathoms	56.2° F.	Fne. gy. S.

Anthias eos, Centristhmus signifer, Pontinus furcirhinus, Kathetostoma averruncus, Lophiomus caulinaris, Peristedium barbiger, Callionymus atrilabiatus, Merluccius angustimanus, Phyciculus longipes, Engyophrys Sancti-Laurenti, Monolene maculipinna, Symphurus atramentatus, Synodus acutus, Myctophum oculeum.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3388	7° 6′ N.	79° 48′ W.	1168 fathoms	36.2° F.	Gn. glob. Oz.

Melamphaës mizolepis, Melamphaës lugubris, Sternoptyx obscura, Argyropelecus lychnus, Cyclothone acclinidens, Myctophum oculeum, Myctophum laternatum, Stomias hexagonatus, Serrivomer sector, Labichthys Bowersii, Atopichthys falcidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3389	7° 16′ 45″ N.	79° 56′ 30″ W.	210 fathoms	48.8° F.	Gn. M.

Pontinus furcirhinus, Trichiurus nitens, Kathetostoma averruncus, Lophiomus spilurus, Bassogigas stelliferoides, Macrurus canus, Monolene maculipinna, Symphurus atramentatus, Lychnopoles argenteolus, Chlorophthalmus mento, Congermuræna proriger, Cryptopterus frontalis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3390	7° 26′ 10″ N.	79° 53′ 50″ W.	56 fathoms	62.6° F.	Fne. gy. S. G.

Kathetostoma averruncus, Zalieutes elater, Prionotus frontalis, Peristedium barbiger, Engyophrys Sancti-Laurenti, Synodus acutus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3391	7° 33′ 40″ N.	79° 43′ 20″ W.	153 fathoms	55.8° F.	Gn. M.

Anthias eos, Pontinus furcirhinus, Kathetostoma averruncus, Lophiomus caulinaris, Peristedium crustosum, Bassogigas stelliferoides, Merluccius angustimanus, Phyciculus longipes, Macrurus canus, Monolene maculipinna, Symphurus atramentatus, Cryptopterus frontalis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3392	7° 5′ 30″ N.	79° 40′ W.	1270 fathoms	36.4° F.	Hard; Rhabdamina.

Raia badia, Dibranchus hystrix, Malthopsis spinosa, Porogadus atripectus, Eretmichthys ocella, Cataetyx simus, Macrurus anguliceps, Sternoptyx obscura, Argyropelecus lychnus, Alepocephalus fundulus, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3393	7° 15′ N.	79° 36′ W.	1020 fathoms	36.8° F.	Gn. M.

Malthopsis spinosa, Bothrocaropsis elongata, Dicrolene filamentosa, Dicrolene nigra, Porogadus longiceps, Monomeropus malispinosus, Antimora rhina, Macrurus bucephalus, Macrurus carminifer, Macrurus convergens, Bathypterois pectoralis, Alepocephalus asperifrons, Serrivomer sector.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3394	7° 21′ N.	79° 35′ W.	511 fathoms	41.8° F.	Dk. gn. M.

Trachichthys mento, Malthopsis spinulosa, Paraliparis angustifrons, Lepophidium emmelas, Dicrolene filamentosa, Monomitopus torvus, Lamprogrammus illustris, Macrurus boöps, Macrurus latirostratus, Halosaurus radiatus, Xenomystax rictus, Chlopsis Gilbertii.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3395	7° 30′ 36″ N.	78° 39′ W.	730 fathoms	38.5° F.	Rocky.

Dibranchichthys nudivomer, Dicrolene pullata, Macrurus carminifer, Argyropelecus lychnus, Myxine circifrons.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3396	7° 32′ N.	78° 36′ 30″ W.	259 fathoms	47.4° F.	Hrd. gy. M. S.

Trachichthys mento, Lophiomus spilurus, Malthopsis sparsa, Merluccius angustimanus, Phyciculus rastrelliger, Halosaurus radiatus, Uroconger varidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3397	7° 33′ N.	78° 34′ 20″ W.	85 fathoms	57.3° F.	Stf. gn. M. brk.

Liopropoma longilepis, Anthias multifasciatus, Centristhmus signifer, Pontinus furcirhinus, Phyciculus rastrelliger.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3398	1° 7′ N.	80° 21′ W.	1573 fathoms	36° F.	Gn. Oz.

Melamphaës mizolepis, Melamphaës maxillaris, Macrurus bucephalus, Sternoptyx obscura, Leptochilichthys Agassizii.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3399	1° 7′ N.	81° 4′ W.	1740 fathoms	36° F.	Gn. Oz.

Sternoptyx obscura, Cyclothone acclinidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3400	0° 36′ S.	86° 46′ W.	1322 fathoms	36° F.	Lt. gy. glob. Oz.

Halieutopsis tumifrons, Mixonus caudalis, Eretmichthys pinnatus, Cataetyx simus, Macrurus anguliceps, Sternoptyx obscura, Bathytroctes alveatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3402	0° 57′ 30″ S.	89° 3′ 30″ W.	421 fathoms	42.3° F.	R. glob. Oz.

Malthopsis erinacea, Dicrolene nigra, Trachyrhynchus helolepis, Sternoptyx obscura, Myctophum oculeum, Myctophum luminosum.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3403	0° 58′ 30″ S.	89° 17′ W.	384 fathoms	43.3° F.	Fne. gy. S. bk. Sp.

Ectreposebastes imus, Hoplostethus pacificus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3404	1° 3′ S.	89° 28′ W.	385 fathoms	43.2° F.	R.

Diplacanthopoma Jordani, Leptophycis filifer, Xenomystax rictus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3406	0° 16′ S.	90° 21′ 30″ W.	551 fathoms	41.3° F.	R.

Argyropelecus lychnus, Cyclothone acclinidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3407	0° 4′ S.	90° 24′ 30″ W.	885 fathoms	37.2° F.	Glob. Oz.

Pseudonus acutus, Macrurus liraticeps, Bathypteroïs pectoralis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3409	0° 18′ 40″ N.	90° 34′ W.	327 fathoms	42.3° F.	Bk. S.

Macrurus loricatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3410	0° 19′ N.	90° 34′ W.	331 fathoms	44.2° F.	Bk. S.

Leptophycis filifer, Læmonema gracillipes, Macrurus loricatus, Argyropelecus lychnus, Atopichthys cinctus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3411	0° 54′ N.	91° 9′ W.	1189 fathoms	36.2° F.	Yl. glob. Oz.

Cyclothone acclinidens.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3412	1° 23′ N.	91° 43′ W.	918 fathoms	38° F.	R.

Myctophum aurolaternatum.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3413	2° 34′ N.	92° 6′ W.	1360 fathoms	36° F.	Glob. Oz. dk. Sp.

Isistius brasiliensis, Halieutopsis tumifrons, Cyclothone acclinidens, Ipnops Agassizii, Dactylostomias filifer, Bathytroctes alvifrons, Halosaurus attenuatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3414	10° 14′ N.	96° 28′ W.	2232 fathoms	35.8° F.	Gn. M.

Melamphaës lugubris, Holcomycteronus digittatus, Argyropelecus lychnus, Cyclothone acclinidens, Myctophum laternatum, Stomias hexagonatus, Dactylostomias filifer, Labichthys Bowersii.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3415	14° 46′ N.	90° 40′ W.	1879 fathoms	36° F.	Br. M. glob. Oz.

Leucicorus lusciosus, Bassozetus nasus, Holcomycteronus digittatus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3417	16° 32′ N.	99° 48′ W.	493 fathoms	40.6° F.	Gn. M.

Dibranchopsis spongiosa, Lepophidium emmelas, Macrurus capito, Xenomystax rictus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3418	16° 33′ N.	99° 52′ 30″ W.	660 fathoms	39° F.	Br. S. bk. Sp.

Dibranchus asper, Dibranchopsis spongiosa, Malthopsis erinacea, Phucocoetes suspectus, Dicrolene filamentosa, Macrurus liolepis, Cyclothone acclinidens, Bathypteroïs ventralis, Dactylostomias filifer, Alepocephalus convexifrons, Venefica tentaculata.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3419	16° 34′ 30″ N.	100° 3′ W.	772 fathoms	39° F.	Gn. M. bk. Sp.

Porogadus atripectus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3421	16° 47′ 20″ N.	100° 0′ 10″ W.	338 fathoms	42.9° F.	Dk. gn. M.

Lepophidium emmelas.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3422	16° 47° 30″ N.	99° 59′ 30″ W.	141 fathoms	53.5° F.	Gn. M.

Lepophidium emmelas, Monolene dubiosa.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3423	16° 47′ 30″ N.	99° 59′ 20″ W.	94 fathoms	56° F.	Gn. M.

Lepophidium emmelas, Bregmaceros longipes.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3424	21° 15′ N.	106° 23′ W.	676 fathoms	38° F.	Gy. S. bk. Sp. Glob.

Macrurus barbiger, Macrurus liolepis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3425	21° 19′ N.	106° 24′ W.	680 fathoms	39° F.	Gn. M. & S.

Dibranchopsis spongiosa, Malthopsis erinacea, Bathypteroïs ventralis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3428	21° 36′ 30″ N.	106° 25′ W.	238 fathoms	48.1° F.	Dk. gy. S. Glob.

Maurolicus lucetius.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3429	22° 30′ 30″ N.	107° 1′ W.	919 fathoms	37° F.	Gn. M. glob. Oz.

Chiasmodon subniger.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3430	23° 16′ N.	107° 31′ W.	852 fathoms	37.9° F.	Bk. S.

Melamphaës frontosus, Macrurus bucephalus.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3431	23° 59′ N.	108° 40′ W.	995 fathoms	37° F.	Lt. bro. M. Glob.

Melamphaës frontosus, Dibranchus scaber, Macrurus latinasutus, Bathypteroïs pectoralis.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3432	24° 22′ 30″ N.	109° 3′ 20″ W.	1421 fathoms	37.8° F.	Br. M. bk. Sp.

Microlepidium grandiceps.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3433	25° 26′ 15″ N.	109° 48′ W.	1218 fathoms	36.5° F.	Br. M. bk. Sp.

Myctophum oculeum, Myctophum atratum, Stomias atriventer.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3434	25° 29′ 30″ N.	109° 48′ W.	1588 fathoms	36.4° F.	Br. M. bk. Sp.

Paraliparis grandiceps, Holcomycteronus digittatus, Nemichthys fronto.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3435	26° 48′ N.	110° 45′ 20″ W.	859 fathoms	37.3° F.	Br. M. bk. Sp.

Lycodes anguis, Porogadus breviceps, Macrurus anguliceps, Cyclothone acclinidens, Myctophum oculeum.

Station.	Latitude.	Longitude.	Depth.	Temperature.	Bottom.
3436	27° 34′ N.	110° 53′ 40″ W.	905 fathoms	37.2° F.	Br. M. bk. Sp.

Bothrocaropsis alalonga, Lycodes anguis, Lycodes serpens, Porogadus breviceps, Macrurus liolepis, Macrurus cuspidatus, Cyclothone acclinidens, Myctophum oculeum.

Station.	Locality.	Depth.	Temperature.	Bottom.
3437	About 50 miles south of Guaymas	628 fathoms	40° F.	Br. M. bk. Sp.

Myctophum oculeum, Myctophum laternatum. Taken in the submarine townet dragged on the bottom.

SYSTEMATIC LIST.

The new Genera and the new Species are those not followed by the Name of an Authority.

- HOLOCEPHALA.
- PLAGIOSTOMIA.
  - **Platosomia.**
    - Raiidæ.
      - *Raia badia.*
      - *Raia borea.*
      - *Raia hyperborea* Coll.
      - *Raia alia.*
  - **Antacea.**
    - Scyliorhinidæ.
    - Squalidæ.
      - *Centroscyllium nigrum.*
    - Scymnorhinidæ.
    - Isistiidæ.
      - *Isistius brasiliensis* Q. G.
    - Chlamydoselachidæ.
      - *Chlamydoselachus anguineus* Garm.
- TELEOSTEA.
  - **Acanthopterygii.**
    - Serranidæ.
      - *Liopropoma longilepis.*
      - *Serranus Bulleri* Boul.
      - *Anthias eos* Gilb.
      - *Anthias multifasciatus* Gill.
      - *Centristhmus.*
      - *Centristhmus signifer.*
    - Scorpænidæ
      - *Pontinus furcirhinus.*
      - *Ectreposebastes.*
      - *Ectreposebastes imus.*
    - Berycidæ.
      - *Hoplostethus pacificus.*
      - *Trachichthys mento.*
      - *Caulolepis subulidens.*
      - *Melamphaës mizolepis* Günt.
      - *Melamphaës lugubris* Gilb.
      - *Melamphaës nigrofulvus.*
      - *Melamphaës maxillaris.*
      - *Melamphaës frontosus.*
    - Trichiuridæ.
      - *Gempylus thyrsitoides* Less.
      - *Trichiurus nitens.*
    - Teuthididæ.
      - *Teuthys elegans.*
    - Trachinidæ.
      - *Chiasmodon subniger.*
    - Uranoscopidæ.
      - *Kathetostoma averruncus* J. B.
    - Lophidia.
    - Lophiidæ.
      - *Lophiomus spilurus.*
      - *Lophiomus caulinaris.*
    - Ceratiidæ.
      - *Dolopichthys.*
      - *Dolopichthys allector.*
    - Antennariidæ.
      - *Chaunax* (*Chaunacops*) *coloratus.*
    - Oncocephalidæ.
      - *Oncocephalus porrectus.*
      - *Zalieutes elater* J. G.
      - *Halieutopsis.*
      - *Halieutopsis tumifrons.*
      - *Dibranchus hystrix.*
      - *Dibranchus scaber.*
      - *Dibranchus asper.*
      - *Dibranchopsis.*
      - *Dibranchopsis spongiosa* Gilb.
      - *Dibranchichthys.*
      - *Dibranchichthys nudivomer.*
      - *Malthopsis sparsa.*
      - *Malthopsis erinacea.*
      - *Malthopsis spinosa.*
      - *Malthopsis spinulosa.*
    - Triglidæ.
      - *Prionotus frontalis.*
    - Peristediidæ.
      - *Peristedium barbiger.*
      - *Peristedium crustosum.*
    - Discoboli.
    - Liparididæ.
      - *Careproctus longifilis* Garm.
      - *Paraliparis fimbriatus* Garm.
      - *Paraliparis grandiceps.*
      - *Paraliparis attenuatus.*
      - *Paraliparis angustifrons.*
      - *Paraliparis latifrons.*
    - Gobiidæ.
      - *Callionymus atrilabiatus.*
    - Blenniidæ.
      - *Entomacrodus cruentatus.*

Anacanthini.

- Zoarcidæ.
  - *Bothrocaropsis.*
  - *Bothrocaropsis alalonga.*
  - *Bothrocaropsis rictolata.*
  - *Bothrocaropsis elongata.*
  - *Gymnelis conorhynchus.*
  - *Lycodopsis scaurus.*
  - *Lycodes anguis.*
  - *Lycodes serpens.*
  - *Lycodes incisus.*
  - *Lycodes cicatrifer.*
  - *Phucocœtes suspectus.*
  - *Phucocœtes latitans* Jen.
  - *Lycodapus fierasfer* Gilb.
  - *Maynea* Cunn.
  - *Maynea bulbiceps.*
- Ophidiidæ.
  - *Lepophidium emmelas* Gilb.
- Brotulidæ.
  - *Leucicorus.*
  - *Leucicorus lusciosus.*
  - *Mixonus caudalis.*
  - *Dicrolene filamentosa.*
  - *Dicrolene nigra.*
  - *Dicrolene pullata.*
  - *Porogadus longiceps.*
  - *Porogadus atripectus.*
  - *Porogadus breviceps.*
  - *Monomitopus* Alc.
  - *Monomitopus torvus.*
  - *Monomeropus.*
  - *Monomeropus malispinosus.*
  - *Bassozetus nasus.*
  - *Diplacanthopoma Jordani.*
  - *Bassogigas stelliferoides* Gilb.
  - *Holcomycteronus.*
  - *Holcomycteronus digittatus.*
  - *Eretmichthys.*
  - *Eretmichthys pinnatus.*
  - *Eretmichthys ocella.*
  - *Cataetyx* Günt.
  - *Cataetyx simus.*
  - *Pseudonus.*
  - *Pseudonus acutus.*
  - *Acanthonus spinifer.*
  - *Sciadonus.*
  - *Sciadonus pedicellaris.*
  - *Lamprogrammus* Alc.
  - *Lamprogrammus illustris.*
- Gadidæ.
  - *Microlepidium.*
  - *Microlepidium grandiceps.*
  - *Leptophycis.*
  - *Leptophycis filifer.*
  - *Merluccius angustimanus.*
  - *Antimora rhina.*
  - *Lœmonema gracillipes.*
  - *Phyciculus longipes.*
  - *Phyciculus rastrelliger.*
  - *Bregmaceros longipes.*
- Macruridæ.
  - *Macrurus bulbiceps.*
  - *Macrurus bucephalus.*
  - *Macrurus liraticeps.*
  - *Macrurus barbiger.*
  - *Macrurus liolepis* Gilb.
  - *Macrurus capito.*
  - *Macrurus leucophæus.*
  - *Macrurus boöps.*
  - *Macrurus fragilis.*
  - *Macrurus carminifer.*
  - *Macrurus gracillicauda.*
  - *Macrurus orbitalis.*
  - *Macrurus loricatus.*
  - *Macrurus cuspidatus.*
  - *Macrurus convergens.*
  - *Macrurus latirostratus.*
  - *Macrurus anguliceps.*
  - *Macrurus latinasutus.*
  - *Macrurus trichiurus.*
  - *Macrurus tenuicauda.*
  - *Macrurus canus.*
  - *Trachyrhynchus helolepis* Gilb.
- Pleuronectidæ.
  - *Hippoglossina vagrans.*
  - *Engyophrys Sancti-Laurenti* J. B.
  - *Citharichthys maculifer.*
  - *Platophrys leopardinus* Günt.
  - *Monolene maculipinna.*
  - *Monolene dubiosa.*
  - *Symphurus varius.*
  - *Symphurus atramentatus*, J. B.
  - *Symphurus microlepis.*

Physostomi.

- Sternoptychidæ.
  - *Sternoptyx obscura.*
  - *Argyropelecus lychnus.*
  - *Argyropelecus caninus.*
  - *Argyropelecus affinis.*
  - *Polyipnus* Günt.
  - *Polyipnus laternatus.*
  - *Valenciennellus stellatus.*
  - *Maurolicus oculatus.*
  - *Maurolicus lucetius.*
  - *Lychnopoles.*
  - *Lychnopoles argenteolus.*
  - *Cyclothone signata.*
  - *Cyclothone acclinidens.*
- Synodontidæ.
  - *Synodus simulans.*
  - *Synodus acutus.*

Chlorophthalmidæ.
Chlorophthalmus mento.
Scopelengys dispar.
Bathypteroïs ventralis.
Bathypteroïs pectoralis.
Ipnops Agassizii.
Myctophidæ.
Myctophum oculeum.
Myctophum tenuiculum.
Myctophum luminosum.
Myctophum aurolaternatum.
Myctophum nitidulum.
Myctophum laternatum.
Myctophum atratum.
Chauliodidæ.
Chauliodus barbatus.
Chauliodus dentatus.
Stomiatidæ.
Stomias Cuv.
Stomias colubrinus.
Stomias hexagonatus.
Stomias atriventer.
Dactylostomias.
Dactylostomias filifer.
Idiacanthidæ.
Idiacanthus antrostomus Gilb.
Alepocephalidæ.
Leptochilichthys.
Leptochilichthys Agassizii.
Bathytroctes alvifrons.
Bathytroctes alveatus.
Bathytroctes inspector.
Narcetes pluriserialis.
Alepocephalus asperifrons.
Alepocephalus convexifrons.
Alepocephalus fundulus.
Halosauridæ.
Halosaurus attenuatus.
Halosaurus radiatus.
Notacanthidæ.
Notacanthus spinosus.
Murænidæ.
Uroconger varidens.
Congermuræna caudalis.
Congermuræna prorigera Gilb.
Congrosoma.
Congrosoma Evermanni.
Cryptopterus frontalis.
Ophichthys biserialis.
Pisodontophis peninsulæ Gilb.
Echidna cocosa.
Echidna scabra.
Xenomystax rictus.
Nettastomidæ.
Chlopsis Gilberti.
Venefica ocella.
Venefica tentaculata.
Nemichthyidæ.
Serrivomer sector.
Labichthys Bowersii.
Nemichthys fronto.
Atopichthyes.
Atopichthys esunculus.
Atopichthys sicarius.
Atopichthys cinctus.
Atopichthys dentatus.
Atopichthys falcidens.
Atopichthys acus.
Atopichthys ophichthys.
Atopichthys cingulus.
Atopichthys lychnis.
Atopichthys obtusus.
Atopichthys longidens.

MYXINIA.

Symphytobranchii.

Myxinidæ.
Myxine Linn.
Myxine circifrons.
Myxine tridentiger.
Myxine australis Jen.
Myxine limosa Gir.
Myxine acutifrons.
Myxine glutinosa Linn.
Homeidæ.
Homea Flem.
Homea cirrhata B. S.

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